IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jeff EDER

Serial No.: 09/761,670

Filed: October 17, 2000

For: A METHOD OF AND SYSTEM FOR EVALUATING CASH FLOW AND ELEMENTS OF A BUSINESS ENTERPRISE

Group Art Unit: 3692

Examiner: Sigfried Chencinski

Brief on Appeal

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20321

Sir or Madam:

This appeal brief is being submitted for the above referenced application in response to the notice of non compliant appeal brief mailed on August 23, 2007. The Table of Contents is on page 2 of this paper.

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Real party in interest

Asset Reliance, Inc. (dba Asset Trust, Inc.)

Related appeals

An appeal for U.S. Patent Application 09/761,671 filed January 18, 2001 may be affected or have a bearing on this appeal. An Appeal for U.S. Patent Application 09/688,983 filed on October 17, 2000 may be affected by or have a bearing on this appeal. An appeal for U.S. Patent Application 10/282,113 filed October 29, 2002 may be affected or have a bearing on this appeal. An Appeal for U.S. Patent Application 10/746,673 filed on December 24, 2003 may be affected by or have a bearing on this appeal.

Status of Claims

Claims 43 - 46, 48 – 52, and claims 54 - 86 are pending and are the subject of this appeal. No other claims are pending. Claims 1 – 42, 47, 53 and 87 – 88 have previously been cancelled without prejudice.

Status of Amendments

An Amendment/Reply was submitted on February 17, 2007 – it did not contain any amendments to the claims.

Summary of Claimed Subject Matter

One embodiment of a method of and system for evaluating cash flow and elements of a business enterprise according to the present invention is best depicted in Figure 1 – 12 of the specification. Figure 1 gives an overview of the major processing steps which include obtaining data for use in analysis and transforming the data into models of real world financial performance for a commercial enterprise using the data. There are five independent claims:

Independent Claim 43 - One embodiment of the method of and system for evaluating cash flow and elements of a business enterprise is exemplified in independent claim 43 where the processor in a computer system obtains a plurality of data in a format suitable for processing and evolves a plurality of network models of one or more aspects of enterprise financial performance from said data.

In the first step, data from a plurality of enterprise management systems are prepared for use in processing as described in FIG.1 reference numbers 200 and 300, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235; FIG. 6 reference numbers 306 - 310, 312, 313, 315 – 317 and line 6, page 17 through the end of page 40 of the specification. The development of the network models requires two types of data:

1. data that represent the aspect of enterprise financial performance being modeled – revenue, expense, capital change or cash flow (the latter being directly related to market value); and

2. data that represents the elements of value in the enterprise.

Before data preparation can begin, the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 1, page 25, though line 26, page 25 and a common data dictionary is established as described in FIG. 5A reference numbers 203, 205 and line 26, page 25 through line 10, page 26 of the specification. Aspects of the acquisition, conversion and storage of data in accordance with a common data dictionary are also described in line 40, column 35 through line 25, column 39 of cross referenced U.S. Patent 5,615,109. The enterprise definition is developed and stored as described in FIG. 5A reference number 206 and line 15, page 26 through line 3, page 27 of the specification. Because there is only one revenue component for each enterprise, the enterprise definition also defines the revenue component of value. This definition is then used to guide the extraction and storage of the data used to represent revenue for model development as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. In a revenue model, the revenue data sets the value of the output node (730) for the network model by period as described in FIG.8A, reference number 504 and line 26, page 46 through line 29, page 46 of the specification.

The identity and definition of elements of value present in the business and the source(s) of data related to their performance are specified by the user as described in FIG. 5B reference number 221 and line 33, page 29 through line 31, page 30 of the specification. The element of value definitions are used to guide the extraction and storage of the data used to calculate composite variables by period as described in FIG. 5B reference number 222 and line 5, page 22 through line 17, page 29 of the specification. Sub-elements of value are optionally enabled by the user. If sub-elements of value are enabled, then their number and identify are determined analytically as described in FIG. 6 reference number 316 and line 25, page 37 through line 29, page 39. The previously stored data related to element of value performance are then transformed into composite variables for the identified elements and sub-elements of value and stored as described in FIG. 6 reference numbers 307 (for elements of value) and 317 (for sub-elements of

value) and line 17, page 35 through line 4 page 37. The stored composite variable values are later used to set the value of the input nodes (710) in the network model. An example of the different elements of value and sub-elements of value included in a model is shown in Table 23 on page 46.

In the second step, the data regarding revenue and elements of value are transformed into a model of real world financial performance through systematic evolution. The evolution of network models for revenue is described in FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, FIG. 9 and line 5, page 44 through line 30, page 49. The narrative on these pages describes the model evolution step where a model is initialized and evolved to a minimum error (maximum fitness) level using a well known set of processing steps that are often completed by a neural network. As detailed in the specification, the normal learning capabilities of the well known set of processing steps are enhanced in a variety of ways. After the initial calculations are completed, a new target level of fitness and parallel populations are optionally established. These steps are repeated until a target level is reached or the maximum number of cycles (specified by the user in system settings) are completed. In the final step, the solution with highest fitness is used to initialize a feed forward network model for training with back-propagation. After the evolution step is completed, the revenue network model is ready for use in a completing variety of useful tasks such as developing a controlling forecast for purchasing optimization. The use of a controlling forecast to optimize purchasing is detailed on line 61, column 25 through line 49, column 27 of cross referenced U.S. Patent 5,615,109.

The data acquisition for expense models follows the same procedure outlined above for revenue models save for the fact that the expense component definition is developed and stored as described in FIG. 5A reference number 207 and line 4, page 27 through line 16, page 27 of the specification. This definition is then be used to guide the extraction and storage of the data used to represent expense by period as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. The evolution of network models for expense is described in FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and it uses the evolution step procedure described above for developing revenue models. The evolution of expense models is described in line 31, page 49 through line 17, page 50 of the specification.

The data acquisition for capital change models follows the same procedure outlined above for expense models. The evolution of network models for capital change is described in FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and uses the evolution step procedure described above for developing revenue models. The evolution of network models for capital change is described in line 20, page 50 through line 8 page 51 of the specification.

The data acquisition for capital change models follows the same procedure outlined above for revenue, expense and capital change models. The evolution of network models for cash flow is described in FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and uses a process that includes the evolution step procedure identified above for developing revenue models. The evolution of network models for cash flow is described in line 10, page 51 through line 3, page 52.

Dependent claims

The limitations associated with dependent claim 44 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571,

572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification and FIG. 9. It is well known by those of average skill in the art that cash flow is related to market value.

The limitations associated with dependent claim 45 are described in line 10, page 16 – line 18, page 16 and Table 17, page 31 of the specification.

The limitations and activities associated with dependent claim 46 are described in FIG 11A reference numbers 604, 607 & 610 and line 20, page 52 – line 5, page 55 of the specification. The act(s) comprises training best fit models and using the weights from the best fit models of each component of value to determine the relative contribution of each element of value using a structure comprised of a plurality of network models.

The limitations associated with dependent claim 48 are described in FIG 5A reference number 202 and line 1, page 24 – line 6, page 25 of the specification.

The limitations and activities associated with dependent claim 49 are described in FIG 11A reference number 611 and line 6, page 55 – line 14, page 55 of the specification. The act(s) comprises combining the relative contribution of each element of value to each component of value with the present value of each component of value to determine a value for each element of value.

The limitations associated with dependent claim 50 are described in a number of places including Table 16, page 30 and Table 17, page 31.

The limitations associated with dependent claim 51 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification and FIG. 9. The structure(s) comprises a plurality of neural network models that are trained with genetic algorithms.

The limitations associated with dependent claim 52 are described in line 24, page 30 – line 3, page 32 of the specification. The structure(s) comprises a plurality of neural network models that use business event data (aka transaction data) for processing.

Independent claim 54 - A second embodiment of the method of and system for evaluating cash flow and elements of a business enterprise is exemplified in independent claim 54 where a two step process aggregates a plurality of data related to a business enterprise and generates a plurality of network models for connecting one or more elements of value to one or more aspects of financial performance of said enterprise using said data.

In the first step, data from a plurality of enterprise management systems are aggregated in accordance with a common data dictionary as described in FIG.1 reference numbers 200 and 300, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235; FIG. 6 reference numbers 306 - 310, 312, 313, 315 – 317 and line 6, page 17 through the end of page 40 of the specification. The development of the network models requires two types of data:

1. data that represent the aspect of enterprise financial performance being modeled – we will

use revenue as the primary example; and

2. data that represents the elements of value in the enterprise.

Before aggregation can begin, the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 1, page 25, though line 26, page 25 and a common data dictionary is established as described in FIG. 5A reference numbers 203, 205 and line 26, page 25 through line 10, page 26 of the specification. Aspects of the acquisition, conversion and storage of data in accordance with a common data dictionary are also described in line 40, column 35 through line 25, column 39 of cross referenced U.S. Patent 5,615,109. After the data dictionary is established, the enterprise(s) being analyzed is defined. The enterprise definition is developed and stored as described in FIG. 5A reference number 206 and line 15, page 26 through line 3, page 27 of the specification. Because there is only one revenue component for each enterprise, the enterprise definition also defines the revenue component of value. This definition is then used to guide the aggregation and storage of the data used to represent revenue for model development as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. In a revenue model, the revenue data sets the value of the output node (730) for the network model by period as described in FIG.8A, reference number 504 and line 26, page 46 through line 29, page 46 of the specification.

The identity and definition of elements of value present in the business and the source(s) of data related to their performance are specified by the user as described in FIG. 5B reference number 221 and line 33, page 29 through line 31, page 30 of the specification. The element of value definitions are used to guide the aggregation and storage of the data used to calculate composite variables by period as described in FIG. 5B reference number 222 and line 5, page 32 through line 17, page 32 of the specification. Sub-elements of value are optionally enabled by the user. If sub-elements of value are enabled, then their number and identify are determined analytically as described in FIG. 6 reference number 316 and line 25, page 37 through line 29, page 39. The previously stored data related to element of value performance are then transformed into composite variables for the identified elements and sub-elements of value and stored as described in FIG. 6 reference numbers 307 (for elements of value) and 317 (for sub-elements of value) and line 17, page 35 through line 4 page 37. The stored composite variable values are later used to set the value of the input nodes (710) in the network model. An example of the different elements of value and sub-elements of value included in a model is shown in Table 23 on page 46.

In the second step, the data regarding revenue and elements of value are used to generate a model of real world financial performance through systematic evolution. The generation of network models for revenue is described in FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, FIG. 9 and line 5, page 44 through line 30, page 49. The narrative on these pages describes the model generation step where a model is initialized and trained to reach a minimum error (maximum fitness) level using a well known set of processing steps that are often completed by using a neural net. As detailed in the specification, the normal learning capabilities of the well known set of processing steps are enhanced in a variety of ways. After the initial calculations are completed, a new target level of fitness and parallel populations are optionally established. These steps are repeated until a target level is reached or the maximum number of cycles (specified by the user in system settings) are completed. In the final step, the solution with highest fitness is used to initialize a feed forward network model for training with back-propagation. After the model generation step is completed, the revenue network model is ready for use in a completing variety of useful tasks such as developing a controlling forecast for purchasing optimization. The use of a controlling forecast to optimize purchasing is detailed on line 61, column 25 through line 49, column 27 of cross referenced U.S. Patent 5,615,109.

The data aggregation for expense models follows the same procedure outlined above for

revenue models save for the fact that the expense component definition is developed and stored as described in FIG. 5A reference number 207 and line 4, page 27 through line 16, page 27 of the specification. This definition is then be used to guide the aggregation and storage of the data used to represent expense by period as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. The generation of network models for expense is described in FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and uses the model generation step (step 2) procedure described above for developing revenue models. The generation of expense models is described in line 31, page 49 through line 17, page 50 of the specification.

The data aggregation for capital change models follows the same procedure outlined above for expense models. The generation of network models for capital change is described in FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and uses the model generation step (step 2) procedure described above for developing revenue models. The generation of network models for capital change is described in line 20, page 50 through line 8 page 51 of the specification.

The data aggregation for cash flow models follows the same procedures outlined above for revenue, expense and capital change models. The generation of network models for cash flow is described in FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and uses a process that includes the model generation step (step 2) procedure identified above for developing revenue models. The generation of network models for cash flow is described in line 10, page 51 through line 3, page 52.

Dependent claims

The limitations associated with dependent claim 55 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, FIG. 9 and line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification. It is well known by those of average skill in the art that cash flow is related to market value.

The limitations associated with dependent claim 56 are described in line 10, page 16 through line 18, page 16 and Table 17, page 31 of the specification.

The limitations and activities associated with dependent claims 57 and 58 are described in FIG 11A reference numbers 604, 607 & 610 and line 20, page 52 through line 5, page 55 of the specification. The act(s) comprise determining the net impact of each element of value on each component of value using network model weights and combining the impact of each element of value with the present value of each component of value to determine a value for each element of value.

The limitations and activities associated with dependent claim 59 are described in the same locations identified previously for claim 44. The act(s) comprises training a plurality of network models by using genetic algorithms.

The limitations and activities associated with dependent claim 60 are described in FIG 5A reference number 202 and line 1, page 24 through line 6, page 25 of the specification.

The limitations and activities associated with dependent claim 61 are described in FIG 11A reference number 611 and line 6, page 55 through line 14, page 55 of the specification. The act(s) comprises combining the relative contribution of each element of value to each component of value with the present value of each component of value to determine a value for each element of value.

The limitations and activities associated with dependent claim 62 are described in a number of places including Table 16, page 30 and Table 17, page 31. The act(s) comprise combining the relative contribution of each element of value with the present value of each component of value to determine a value for each element of value.

The limitations associated with dependent claim 63 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification and FIG. 9. The structure comprises a plurality of neural network models.

The limitations associated with dependent claim 64 are described in FIG 5A reference number 205 and line 12, page 26 through line 3, page 27 of the specification.

The limitations associated with dependent claim 65 are described in line 24, page 30 through line 3, page 32 of the specification. The structure comprises a plurality of neural network models that use business event data (aka transaction data) for processing.

The limitations associated with dependent claim 66 are a number of places including FIG 1 reference numbers 5, 10, 15, 30, 35 and 40 and FIG. 5B reference number 222.

Independent Claim 67 - A third embodiment of the method of and system for evaluating cash flow and elements of a business enterprise is exemplified in independent claim 67 where a two step method integrates a plurality of data related to a business enterprise and generates a plurality of network models for connecting one or more elements of value to one or more aspects of financial performance of said enterprise.

In the first step, data from a plurality of enterprise management systems are integrated in accordance with a common data dictionary as described in FIG.1 reference numbers 200 and 300, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235; FIG. 6 reference numbers 306 - 310, 312, 313, 315 – 317 and line 6, page 17 through the end of page 40 of the specification. The development of the network models requires two types of data:

1. data that represent the aspect of financial performance being modeled – we will use revenue as an example, and

2. data that represents the elements of value.

Before integration can begin, the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 1, page 25, though line 26, page 25 and a common data dictionary is established as described in FIG. 5A reference numbers 203, 205 and line 26, page 25 through line 10, page 26 of the specification. Aspects of the acquisition, conversion and storage of data in accordance with a common data dictionary are also described in

line 40, column 35 through line 25, column 39 of cross referenced U.S. Patent 5,615,109. Because there is only one revenue component for each enterprise, the enterprise definition also defines the revenue component. The enterprise definition is developed and stored as described in FIG. 5A reference number 206 and line 15, page 26 through line 3, page 27 of the specification. This definition is then used to guide the integration and storage of the data used to represent revenue for model development as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. In a revenue model, the revenue data sets the value of the output node (730) for the network model by period as described in FIG.8A, reference number 504 and line 26, page 46 through line 29, page 46 of the specification.

The identity and definition of elements of value present in the business and the source(s) of data related to their performance are specified by the user as described in FIG. 5B reference number 221 and line 33, page 29 through line 31, page 30 of the specification. The element of value definitions are used to guide the integration and storage of the data used to calculate composite variables by period as described in FIG. 5B reference number 222 and line 5, page 32 through line 17, page 29 of the specification. Sub-elements of value are optionally enabled by the user. If sub-elements of value are enabled, then their number and identify are determined analytically as described in FIG. 6 reference number 316 and line 25, page 37 through line 29, page 39. The previously stored data related to element of value performance are then transformed into composite variables for the identified elements and sub-elements of value and stored as described in FIG. 6 reference numbers 307 (for elements of value) and 317 (for sub-elements of value) and line 17, page 35 through line 4 page 37. The stored composite variable values are later used to set the value of the input nodes (710) in the network model. An example of the different elements of value and sub-elements of value included in a model is shown in Table 23 on page 46.

In the second step, the data regarding revenue and elements of value are used to generate a model of real world financial performance through systematic evolution. The generation of network models for revenue is described in FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, FIG. 9 and line 5, page 44 through line 30, page 49. The narrative on these pages describes the model generation step where a model is initialized and trained to reach a minimum error (maximum fitness) level using a well known set of processing steps that are often completed by using a neural network. As detailed in the specification, the normal learning capabilities of the well known set of processing steps are enhanced in a variety of ways. After the initial calculations are completed, a new target level of fitness and parallel populations are optionally established. These steps are repeated until a target level is reached or the maximum number of cycles (specified by the user in system settings) are completed. In the final step, the solution with highest fitness is used to initialize a feed forward network model for training with back-propagation. After the model generation step is completed, the revenue network model is ready for use in a completing variety of useful tasks such as developing a controlling forecast for purchasing optimization. The use of a controlling forecast to optimize purchasing is detailed on line 61, column 25 through line 49, column 27 of cross referenced U.S. Patent 5,615,109.

The data integration for expense models follows the same procedure outlined above for revenue models save for the fact that the expense component definition is developed and stored as described in FIG. 5A reference number 207 and line 4, page 27 through line 16, page 27 of the specification. This definition is then be used to guide the integration and storage of the data used to represent expense by period as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. The generation of network models for expense is described in FIG. 8B reference numbers 505, 507, 508, 525, 530, 535, 540, 545 and 550 and uses the model generation step procedure described above for developing revenue models. The generation of expense models is described in line 31, page 49 through line 17, page 50 of the specification.

The data integration for capital change models follows the same procedure outlined above for expense models. The generation of network models for capital change is described in FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and uses the model generation step procedure described above for developing revenue models. The generation of network models for capital change is described in line 20, page 50 through line 8 page 51 of the specification.

The data integration for cash flow models follows the same procedures outlined above for revenue, expense and capital change models. The generation of network models for cash flow is described in FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and uses a process that includes the model generation step (step 2) procedure identified above for developing revenue models. The generation of network models for cash flow is described in line 10, page 51 through line 3, page 52.

Dependent claims

The limitations and activities associated with dependent claim 68 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, FIG. 9 and line 5, page 44 through line 30, page 49, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification. It is well known by those of average skill in the art that cash flow is related to market value.

The limitations and activities associated with dependent claim 69 are described in line 10, page 16 through line 18, page 16 and Table 17, page 31 of the specification.

The limitations and activities associated with dependent claims 70 and 71 are described in FIG 11A reference numbers 604, 607 & 610 and line 20, page 52 through line 5, page 55 of the specification. The act(s) comprise determining the net impact of each element of value on each component of value using weights from a best fit model and combining the impact of each element of value with the present value of each component of value to determine a value for each element of value.

The limitations and activities associated with dependent claim 72 are described in the same locations identified previously for claim 44. The act(s) comprises training a plurality of network models with genetic algorithms.

The limitations associated with dependent claim 73 are described in FIG 5A reference number 202 and line 1, page 24 through line 6, page 25 of the specification.

The limitations and activities associated with dependent claim 74 are described in FIG 11A reference number 611 and line 6, page 55 through line 14, page 55 of the specification. The act(s) comprise combining the relative contribution of each element of value with the present value of each component of value to determine a value for each element of value.

The limitations associated with dependent claim 75 are described in a number of places including Table 16, page 30 and Table 17, page 31.

The limitations associated with dependent claim 76 are described in a number of places including FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of

the specification; FIG. 8A reference numbers 501 – 504, 525, 530, 535, 540, 545 and 550, line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 505, 507 and 508, 525, 530, 535, 540, 545 and 550 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 511, 513 and 514, 525, 530, 535, 540, 545 and 550 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 571, 572 and 573, 525, 530, 535, 540, 545 and 550 and line 10, page 51 through line 3, page 52 of the specification and FIG. 9. The structure comprises a plurality of neural network models.

The limitations associated with dependent claim 77 are described in FIG 5A reference number 205 and line 12, page 26 through line 3, page 27 of the specification.

The limitations associated with dependent claim 78 are described in line 24, page 30 through line 3, page 32 of the specification. The structure comprises a plurality of neural network models that use business event data (aka transaction data) for processing.

The limitations associated with dependent claim 79 are described in a number of places including FIG 1 reference numbers 5, 10, 15, 30, 35 and 40 and FIG. 5B reference number 222.

Independent Claim 80 - A fourth embodiment of the method of and system for evaluating cash flow and elements of a business enterprise is exemplified in independent claim 80 where a method accesses a plurality of enterprise transaction data via an interface coupled to a plurality of data sources, converts said data to a common schema using an application software segment and stores the data for later use in processing. The plurality of data sources are identified in FIG. 1 and line 22, page 10 through line 25, page 10.

More specifically, an application software segment uses an interconnection network connected to a plurality of data sources to extract data from each source before integrating and storing said data in accordance with a common schema as described in FIG.1 reference numbers 200, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235 and line 6, page 17 through the end of page 40 of the specification. Before integration can begin, the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 1, page 25, though line 26, page 25 and a data dictionary file is established as described in FIG. 5A reference numbers 203, 205 and line 26, page 25 through line 10, page 26 of the specification. Aspects of the development and use of a common data dictionary to support data extraction, conversion and storage are also described in line 40, column 35 through line 15, column 38 of cross referenced U.S. Patent 5,615,109.

The enterprise definition and the definitions for revenue, expense and capital change are developed and stored as described in FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification. Because there is only one revenue component for each enterprise, the enterprise definition also defines the revenue component. These definitions are then combined with the previously developed information to guide the extraction, integration and storage of the financial data used to represent aspects of financial performance for model development as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. In a revenue model, the revenue data sets the value of the output node (730) for the network model by period as described in FIG. 8A, reference number 504 and line 26, page 46 through line 29, page 46 of the specification. In a similar fashion, the expense data sets the value of the output node (730) for expense models as described in FIG. 8B, reference number 508 and line 8 of page 50 of the specification and the capital change data sets the value of the output node (730) for capital change models as described in FIG. 8C, reference number 514 and line 32 of page 50 of the specification.

The identity and definition of elements of value present in the business and the source(s) of data related to their performance are specified by the user as described in FIG. 5B reference number 221 and line 33, page 29 through line 31, page 30 of the specification. The element of value definitions are combined with previously developed information to guide the integration and storage of the data used to calculate composite variables by period as described in FIG. 5B reference number 222 and line 5, page 32 through line 17, page 29 of the specification. Sub-elements of value are optionally enabled by the user. If sub-elements of value are enabled, then their number and identify are determined analytically as described in FIG. 6 reference number 316 and line 25, page 37 through line 29, page 39. The previously stored data related to element of value performance are then transformed into composite variables for the identified elements and sub-elements of value and stored as described in FIG. 6 reference numbers 307 (for elements of value) and 317 (for sub-elements of value) and line 17, page 35 through line 4 page 37. The stored composite variable values are later used to set the value of the input nodes (710) in the network model. The acquisition, conversion and storage of data in accordance with a common data dictionary is also described in line 40, column 35 through line 25, column 39 of cross referenced U.S. Patent 5,615,109. After the processing is completed as outlined above, the extracted data have been converted and stored in accordance with a common schema.

Dependent claims

The limitations associated with dependent claim 81 are described in line 7, page 17 through line 34, page 17 of the specification. The structure comprises a plurality of relational databases.

The limitations and activities associated with dependent claim 82 are described in FIG. 1 reference number 25 and line 21, page 10 through line 35, page 10 of the specification. The structure comprises a network connection.

The limitations and activities associated with dependent claim 83 are described in FIG. 5A reference numbers 203, 205. FIG 9 reference number 703 and 710 and line 26, page 25 through line 10, page 26 of the specification.

The limitations and activities associated with dependent claim 84 are described in Table 12, page 24, FIG. 5A reference number 210, FIG. 5B reference number 222, line 5, page 22 through line 17, page 29 of the specification. The conversion and storage of data is also described in line 40, column 35 through line 25, column 39 of cross referenced U.S. Patent 5,615,109. The act(s) comprise converting and storing data.

Independent Claim 85 - A fifth embodiment of the method of and system for evaluating cash flow and elements of a business enterprise is exemplified in independent claim 85 where a method identifies the data required for analyzing a commercial enterprise, prepares the data for use in analysis, analyzes the data to identify a number of statistics before developing a model of enterprise current operation financial performance using said statistics and automated learning.

More specifically, the data required for analyzing a commercial enterprise are identified and prepared for use in accordance with the method described as described in FIG.1 reference numbers 200 and 300, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235; FIG. 6 reference numbers 306 - 310, 312, 313, 315 – 317 and line 6, page 17 through the end of page 40 of the specification. Before data preparation can begin, the time periods where data are required are determined as described in FIG. 5A reference number 202 and line 1, page 25, though line 26, page 25 and a common data dictionary is established as described in FIG. 5A reference numbers 203, 205 and line 26, page 25 through line 10, page 26 of the specification. Aspects of the acquisition, conversion and storage of data in accordance with a common data dictionary are described in line 40, column 35 through line 25,

column 39 of cross referenced U.S. Patent 5,615,109. The enterprise definition and the definitions for revenue, expense and capital change are developed and stored as described in FIG. 5A reference numbers 206 and 207 and line 15, page 26 through line 16, page 27 of the specification. Because there is only one revenue component for each enterprise, the enterprise definition also defines the revenue component of value. These definitions are then used to guide the extraction and storage of the data used to represent revenue, expense and capital for model development as described in FIG. 5A reference number 210 and line 1, page 29 through line 17, page 29 of the specification. In a cash flow model, the cash flow data (derived from revenue, expense and capital change data in a manner that is well known) sets the value of the output node (730) for the network model by period as described in FIG.8D, reference number 573 and line 26, page 51 through line 1, page 52 of the specification. The identity and definition of elements of value present in the business and the source(s) of data related to their performance are specified by the user as described in FIG. 5B reference number 221 and line 33, page 29 through line 31, page 30 of the specification. The element of value definitions are used to guide the extraction and storage of the data used to calculate composite variables by period as described in FIG. 5B reference number 222 and line 5, page 32 through line 17, page 29 of the specification. Sub-elements of value are optionally enabled by the user. If sub-elements of value are enabled, then their number and identify are determined analytically as described in FIG. 6 reference number 316 and line 25, page 37 through line 29, page 39.

The previously stored data related to element of value performance are then transformed into composite variables for the identified elements and sub-elements of value and stored as described in FIG. 6 reference numbers 307 (for elements of value) and 317 (for sub-elements of value) and line 17, page 35 through line 4 page 37. A number of statistics are developed in accordance with the composite variable specifications identified in Table 17 on page 31. The calculations are completed with the method describe on FIG. 6 reference numbers 307 and 317 and line 44, page 35 through line 3 page 36 of the specification. The statistics are then combined to calculate the composite variable values using the formula shown on Table 21 page 36. The composite variable values are used to set the value of the input nodes (710) in the network model. An example of the different elements of value and sub-elements of value included in a model is shown in Table 23 on page 46. A model of current operation financial performance that incorporates the composite variables containing the calculated statistics is then developed by using the well known set of processing steps that are often completed by using a neural network. As detailed in the specification, the automated learning capabilities of the well known set of processing steps are enhanced in a variety of ways. As part of this process the number of nodes used to initialize a model are identified (line 35, page 45, through line 35, page 46) before the model is evolved to a minimum error (high fitness) level. The solution with highest fitness is used to initialize a feed forward network model for training with back-propagation and use in modeling financial performance as described in line 35, page 46 through line 25, page 49 of . As detailed in the specification, the model is a current operation cash flow model. Alternatively the components of value (revenue, expense and/or capital change) can be modeled and analyzed.

Dependent claim

The limitations and activities associated with dependent claim 86 are described in a number of places including FIG. 8A reference numbers 525, 530 and 535, and line 5, page 44 through line 30, page 49 of the specification, FIG. 8B reference numbers 525, 530 and 535 and line 31, page 49 through line 17, page 50 of the specification; FIG. 8C reference numbers 525, 530 and 535 and line 20, page 50 through line 8 page 51 of the specification; and FIG. 8D reference numbers 525, 530 and 535 and line 10, page 51 through line 3, page 52 of the specification. The act(s) comprise completing a number of automated learning steps that enhance the automated learning capabilities of the well known set of processing steps that are often completed by a neural net.

Grounds of rejection to be reviewed on appeal

Issue 1 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

Issue 2 - Whether claim 63 and/or claim 76 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988) in view of Jost (U.S. Patent 5,361,201)?

Issue 3 - Whether claim 51 and/or claim 86 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988) in view of Barr (U.S. Patent 5,761,442)?

Issue 4 - Whether claim 80, claim 81, claim 82, claim 83 and/or claim 84 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

Issue 5 - Whether claim 85 is patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

Issue 6 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are enabled under 35 USC 112, first paragraph?

Issue 7 - Whether the invention described in claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51 and claim 52, represents patentable subject matter under 35 USC 101?

Issue 8 - Whether the invention described in claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66 represents patentable subject matter under 35 USC 101?

Issue 9 - Whether the invention described in claims claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 represents patentable subject matter under 35 USC 101?

Issue 10 - Whether the invention described in claims 80, claim 81, claim 82, claim 83, and claim 84 represents patentable subject matter under 35 USC 101?

Issue 11 - Whether the invention described in claim 85 and claim 86 represents patentable subject matter under 35 USC 101?

Issue 12 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and/or claim 79 are indefinite under 35 USC 112, second paragraph?

Issue 13 - Whether claim 80, claim 81, claim 82, claim 83 and/or claim 84 are indefinite under 35 USC 112, second paragraph?

Issue 14 – Whether claim 85 and/or claim 86 are indefinite under 35 USC 112, second paragraph?

The Argument

Grouping of Claims
For each ground of rejection which Appellant contests herein that applies to more than one claim, such additional claims, to the extent separately identified and argued below, do not stand and fall together.

Issue 1 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

The claims are patentable because the claims describe inventions that produce results that are concrete, tangible and useful. Other reasons the claims are patentable include the fact that the proposed modification of the Sandretto document fails to establish a prima facie case of obviousness because:

1. Sandretto fails to make the invention as a whole obvious by teaching away from the claimed methods;

2. Sandretto fails to teach one or more limitation for every claim;

3. Modifying Sandretto to replicate the functionality of the claimed inventions would requires a change in the principles governing the operation of the Sandretto invention;

4. The Examiner has been unable to identify the specific manner in which the Sandretto invention is to be modified.

Reason #1 – The first reason the claims are patentable is that the proposed modification of Sandretto fails to establish a prima facie case of obviousness for claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 because Sandretto teaches away from all claimed methods. MPEP § 2141.02 states that: *"in determining the difference between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious but whether the claimed invention as a whole would have been obvious."* Furthermore, it is well established that: *A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).* Examples of Sandretto teaching away from the claimed invention include:

1) Sandretto <u>teaches and relies on the evaluation of assets on an individual basis</u>. Consistent with this approach, Sandretto teaches that the data estimates required for operation of its method are specific to each asset. Sandretto also teaches that these estimates can be input directly in to the system and that as few as three inputs per asset are required (see page 52 & 56, Evidence Appendix Sandretto, Abstract, C9 L45 – 55 & C10, L 1 – 7). The one asset at a time analysis of this data is completed by using of an iterative loop that helps develop a consistent set of assumptions (see page 55 – 56 Evidence Appendix C8, L60 – C10, L7). By way of contrast, <u>the claimed invention teaches and relies on the evaluation of elements of value as a group</u>. Consistent with this approach, the claimed invention teaches a reliance on years of historical and forecast company level data aggregated from the systems used to manage company operations

(basic financial system, advanced financial system, operation management system sales management system and human resource management system). The analysis of the element of value group is completed by a network model that simultaneously analyzes the performance of all the elements of value in an organization.

2) Consistent with the first teaching, <u>Sandretto teaches and relies on the fact that there is no interaction between the different assets</u>. Closely related to the first teaching, <u>the claimed invention teaches that there may be interaction between the different elements of value</u>. The level of interaction is identified by the weights in the network model.

3) <u>Sandretto teaches that the future is going to be a continuation of the past</u>. Sandretto teaches and relies on methods which take historical results and projects them forward as required to develop a forecast of cash flow for a specified time period (see page 55 Evidence Appendix C8, L60 – 63). By way of contrast, <u>the claimed invention teaches that the future is a function of the real world performance of a plurality of elements of value</u>. In particular, the claimed invention teaches and relies on the use of a novel method that forecasts the value of each aspect of financial performance as a function of the performance of a plurality of elements of value.

4) <u>Sandretto teaches the identification of a discount rate that matches a known portfolio value for a given set of asset cash flows</u>. By way of contrast, <u>the claimed invention identifies an impact for a plurality of elements of value on the actual and forecast financial performance (i.e. cash flow) of an enterprise</u>.

<u>Reason #2</u> - The second reason that Sandretto fails to establish a prima facie case of obviousness that would support the rejection of claims claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 is that Sandretto does not teach or suggest one or more of the limitations for every rejected claim. *MPEP 2142 provides that: in order to establish a prima facie case of obviousness…the prior art reference (or references when combined) must teach or suggest all the claim limitations.* Limitations not taught by the cited document include:

1) Claims 43, 54, 67 (affects 44 – 50, 52, 55 – 66, and 68 - 79). Limitations not taught include:

evolve/generate a plurality of network models for connecting one or more elements of value of said firm to one or more aspects of financial performance of said firm, said network models being further comprised of:

input nodes, hidden nodes and output nodes where each input node represents an element of value and each output node represents an aspect of financial performance; and

a plurality of relationships between said nodes, each said relationship being characterized by a degree of influence from one node to another; said degree of influence being dependent upon an impact of the element of value represented by said node and its interrelationship with other elements of value
where each network model from a plurality of network models supports the development of a controlling forecast for use in optimizing purchasing

Sandretto does not teach a network model or a plurality of network models of any kind, elements of value, input nodes, hidden nodes, output nodes, relationships between nodes, the development of a controlling forecast and/or purchasing optimization.

2) Claims 44, 55 and 68. Limitations and activities not taught include:

one or more aspects of financial performance are selected from the group consisting of revenue, expense, capital change, market value and combinations thereof

Sandretto does not teach or suggest revenue expense or capital change;

3) Claims 45, 56 and 69. Limitations and activities not taught include:

a summary of value drivers by element of value applied to each of said input nodes, where said summaries summarize the impact of each of said elements of value on one or more aspects of financial performance

Sandretto does not teach or suggest a summary of value drivers by element of value, input nodes of any kind or summarizing impact;

4) Claims 46, 57, 58, 70 and 71. Limitations and activities not taught include:

where the weights from the best fit models are used to identify the relative contribution of each element of value to each component of value net of any impact on the other elements of value

Sandretto does not teach or suggest using weights from models to determine relative contribution and does not teach that the contribution is net of an impact on other elements of value;

5) Claims 48, 60 and 73. Limitations and activities not taught include:

where a plurality of relationships are quantified for a specified point in time within a sequential series of points in time

Sandretto does not teach or suggest quantifying a plurality of relationships at any time and does not teach a specified point in time within a sequential series of points in time;

6) Claims 49, 61 and 74. Limitations and activities not taught include:

the relative contributions to the components of value are combined with the present value of said components of value to determine the current operation value of each element of value where the components of value are revenue, expense and capital change

Sandretto does not teach or suggest components of value, quantifying a relative contribution to the components of value, combining a relative contribution to the components of value with a present value of the components of value;

7) Claims 50, 62 and 75. Limitations and activities not taught include:

where an element of value is selected from the group consisting of brands, customers, employees, and combinations thereof

Sandretto does not teach or suggest brands, customers, employees or combinations thereof;

8) Claims 52, 65 and 78. Limitations and activities not taught include:

wherein a plurality of network models further comprise a plurality of business event network models.

Sandretto does not teach or suggest the use of transactions (also known as business events) to build network models;

8) Claims 59 and 72. Limitations and activities not taught include:

training one or more best fit network models using one or more genetic algorithms.

Sandretto does not teach network models, genetic algorithms or training network models with genetic algorithms;

9) Claims 64 and 77. Limitations and activities not taught include:

where the firm is a division or a company;

Sandretto does not teach a firm of any type and does not teach a division or a company; and

10) Claims 66 and 79. Limitations and activities not taught include:

training one or more best fit network models using one or more genetic algorithms.

Sandretto does not teach network models, genetic algorithms or training network models with genetic algorithms.

Reason #3 - The third reason the claims are patentable is that the cited document fails to establish a prima facie case of obviousness for claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 because the unspecified modification would have to change one or more of the principles of operation of the invention disclosed in Sandretto. MPEP 2143.01 provides that when "*the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)*". One of the changes in operating principle required to make Sandretto function is discussed below.

- Sandretto teaches and relies on the principle that the performance of each asset is independent of the other assets and that there is no interaction between the assets (see page 56 Evidence Appendix C10, L 1 - 7). The Examiner has proposed modifying Sandretto to render obvious an invention that teaches and relies on the principle that the performance of an element of value can only be evaluated by analyzing the element of value as part of an inter-connected network of other elements of value. The Appellant respectfully submits that this modification would only be possible if the principle of operation of the Sandretto invention were changed to recognize that assets, like elements of value, are not independent. Because a change in the principle of the operation of Sandretto is required to enable the cited modification to replicate the functionality of the claimed inventions, the teachings of the document are not sufficient to render the claims prima facie obvious.

The Appellant notes that there are still other changes in the principle of operation of the inventions described by the cited document that would be required to replicate the claimed invention.

Reason # 4 and #5 - A fourth reason claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 64, claim 65, claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 77, claim 78 and/or claim 79 are patentable is because the Examiner has not been able to explain how the Sandretto invention will be modified to produce anything useful in violation of MPEP 706.02. Finally, as noted previously, a fifth reason the claims are allowable is that the claimed invention produces results that are concrete, tangible and useful.

Issue 2 - Whether claim 63 and claim 76 are patentable under 35 USC 103(a) over Sandretto

(U.S. Patent 5,812,988) in view of Jost (U.S. Patent 5,361,201)?

Claim 63 and claim 76 are patentable in view of the shortcomings in the arguments that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claims 63 and 76 are allowable for the first, second, third and fifth reasons advanced under Issue 1.

Reason #5 - A fifth reason claim 63 and claim 76 are patentable is that the cited combination of documents fails to establish the prima facie case of obviousness required to sustain the rejections of claim 63 and 76 because the cited combination of documents teach away from the proposed combination. MPEP § 2145 X.D.2 provides that: *"it is improper to combine references where the references teach away from their combination."* The cited combination of documents teaches away from the proposed combination in at least two ways as detailed below.

    1. Incompatible valuation methodologies. Sandretto teaches that asset values in an efficient market are a function of several things including: cash flow, expected terminal value and the correlation of asset cash flows with a market index (see page 54 Evidence Appendix, Sandretto, C3 L21 - 37). On the other hand, Jost teaches that asset value is a function of the physical characteristics of an asset and its immediate neighborhood (see page 57, Evidence Appendix Jost, C2 L 30 - 51). It clearly would be improper to combine the teachings of two documents with radically different valuation methodologies; and

    2. Incompatible methods for analyzing data. Sandretto teaches the use of inputs from external sources and assumptions to generate estimates for a number of required variables. The remaining variable is estimated by iterating its value as required to eliminate a need for change (see pages 52, 55 & 56 Evidence Appendix, Sandretto, abstract, C8, L60 – C9, L24). Jost teaches learning relationships from the data and using the learned relationships to estimate value ((see page 57, Evidence Appendix, Jost, C2 L 30 - 51). It clearly would be improper to combine the cited documents as they teach and rely on fundamentally different approaches to analyzing data.

The Appellant notes that are still other ways in which the two references teach away from the proposed theoretical combination.

Reason #6 - A sixth reason claim 63 and claim 76 are patentable is the fact that the Examiner has not been able to explain how the combination can be made to produce anything useful. It is well established that *"particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"* (In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000)). In spite of this well known requirement, the Examiner has not explained how or why the combination of Sandretto and Jost should be made in spite of numerous reasonable requests that the Examiner provide such an explanation. The inability to explain how the teachings of two patents (that teach those of average skill in the art how to make and practice their inventions) should be combined provides evidence that the Examiner does not possess the average level of skill in the art required to author valid written description or claim rejections.

Issue 3 - Whether claim 51 and claim 86 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988) in view of Barr (U.S. Patent 5,761,442)?

The claims are patentable in view of the shortcomings in the arguments contained that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claims 51 and 86 are allowable for the: first, second, third, and fifth reasons advanced under Issue 1.

Reason #5 - A fifth reason the claims are patentable is that the cited combination of documents fails to establish the prima facie case of obviousness required to sustain the rejections of claim 51 and 86 because the cited combination of documents teach away from the proposed combination. MPEP § 2145 X.D.2 provides that: "*it is improper to combine references where the references teach away from their combination.*" The cited combination of documents teaches away from the proposed combination in at least two ways as detailed below:

1. Incompatible methods for analyzing data. Sandretto teaches the use of inputs from external sources and assumptions to generate estimates for a number of required variables for developing a consistent estimate of value that may or may not bear any resemblance to reality. The remaining variables are estimated by iterating their value as required to eliminate the need for change (see pages 52, 55 & 56 Evidence Appendix, Sandretto, abstract, C8, L60 – C9, L24). Barr teaches learning relationships from the data and using the learned relationships to estimate value (see page 59 Evidence Appendix Barr, C3, L63 - C4, L50). It clearly would be improper to combine the cited documents as they teach and rely on fundamentally different approaches to analyzing data.

2. Incompatible market efficiency and value assumptions. Sandretto teaches that asset values in an efficient market are a function of three things: cash flow, expected terminal value and the correlation of asset cash flows with a market index (see page 54 Evidence Appendix, Sandretto, C3 L21 - 37). Barr teaches that the market is inefficient and that market values are a function of several factors which can be identified with a neural network (see page 58 - 59 Evidence Appendix, Sandretto, C1 L 10 -20 and C4 L43 - 50). It clearly would be improper to combine the cited documents as they teach and rely on fundamentally different assumptions about market efficiency and fundamentally different approaches to determining value.

Reason #6 - A sixth reason the claims are patentable is that the Examiner has not been able to explain how the proposed combination can be made to produce anything useful. It is well established that "*particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed*" (In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000)). In spite of this well known requirement, the Examiner has not explained how or why the combination of Sandretto and Barr would be completed. The inability to explain how the teachings of two patents (that teach those of average skill in the art how to make and practice their inventions) should be combined provides evidence that the Examiner does not possess the level of skill in the art required to author valid rejections of patent application written descriptions and/or claims.

Issue 4 - Issue 4 - Whether claim 80, claim 81, claim 82, claim 83 and claim 84 are patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

The claims are patentable in view of the shortcomings in the arguments contained that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claim 80, claim 81, claim 82, claim 83 and claim 84 are allowable for the first, third, fourth and fifth reasons advanced under Issue 1.

Reason #5 - A fifth reason the claims are patentable is that the cited document fails to suggest one or more limitation of every claim. MPEP 2142 provides that: "*in order to establish a prima facie case of obviousness, three basic criteria must be met.....Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.* Limitations that are not taught or suggested by Sandretto include:

1) Claim 80. Limitations and activities not taught include:

accessing a plurality of enterprise transaction data via an interface coupled to a plurality of data sources, converting said transaction data to a common schema using an application software segment, and storing said converted data in a database for use in processing.

Sandretto does not teach accessing a plurality of enterprise transaction data via an interface, and/or converting data to a common schema;

2) Claims 81. Limitations and activities not taught include:

wherein a plurality of sources further comprise a plurality of relational databases where said databases use different data formats.

Sandretto does not teach relational databases or a plurality of relational databases;

3) Claims 82. Limitations and activities not taught include:

wherein an interface further comprises a network connection;

Sandretto does not teach a network interface for receipt of input data;

4) Claims 83. Limitations and activities not taught include:

wherein a common schema further comprises a network schema and said common schema contains a common data dictionary

Sandretto does not teach a common schema, a network schema or a common data dictionary; and

5) Claims 84. Limitations and activities not taught include:

the method further comprises completing a conversion and storage of data before processing begins;

Sandretto does not teach the conversion of data.

Issue 5 - Whether claim 85 is patentable under 35 USC 103(a) over Sandretto (U.S. Patent 5,812,988)?

The claim is patentable in view of the shortcomings in the arguments contained that were detailed in issue 1 and the usefulness of the results produced by the claimed invention. In particular, claim 85 is allowable for the first, third, fourth and fifth reasons advanced under Issue 1. A fifth reason the claims are patentable is that the cited document fails to suggest one or more limitation of the claim. MPEP 2142 provides that: *"in order to establish a prima facie case of obviousness, three basic criteria must be met.....Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.* Limitations that are not taught or suggested by Sandretto include:

1) Claims 85. Limitations and activities not taught include:

identifying a set of data required for analyzing a commercial enterprise, preparing the identified set of data for use in analysis, analyzing at least a portion of said data in an automated fashion as required to identify one or more statistics selected from the group consisting of pattern, trend, ratio, average, elapsed time period, percentage, variance, monthly total and combinations thereof, and using at least a portion of said statistics and data to develop a model of enterprise current operation financial performance using automated learning;

Sandretto does not teach identifying data required for analyzing a commercial enterprise, preparing the data for use in analysis, analyzing the data as required to identify statistics and using the statistics to develop a model of enterprise current operation financial performance using said statistics.

Issue 6 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are enabled under 35 USC 112, first paragraph?

Claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are patentable for at least four separate reasons:

1. the Examiner fail to establish a prima facie case that would support a written description rejection under 35 USC 112 first paragraph for a single claim;

2. the specification and drawings clearly explain how to make and use the invention described by each of the cited claims;

3. the written description of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents and patent applications, an apparent violation of 35 USC 3;

4. the arguments presented by the Examiner that were used to support a written description rejection under 35 USC 112 first paragraph fail to comply with the requirements of the Administrative Procedures Act and are therefore moot.

Reason #1 - The first reason that claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are patentable is that the Examiner has failed to establish a prima facie case that the specification does meet the enablement requirements of §112 first paragraph. MPEP 2163 states that: *"A description as filed is presumed to be adequate, unless or until sufficient evidence or reasoning to the contrary has been presented by the examiner to rebut the presumption. See, e.g., In re Marzocchi, 439 F.2d 220, 224, 169 USPQ 367, 370 (CCPA 1971). The examiner, therefore, must have a reasonable basis to challenge the adequacy of the written description. The examiner has the initial burden of presenting by a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims. Wertheim, 541 F.2d at 263, 191 USPQ at 97. In rejecting a claim, the examiner must set forth express findings of fact regarding the above analysis which support the lack of written description conclusion. These findings should:*
(A) Identify the claim limitation at issue; and
(B) Establish a prima facie case by providing reasons why a person skilled in the art at the time the application was filed would not have recognized that the inventor was in possession of the invention as claimed in view of the disclosure of the application as filed. A general allegation of "unpredictability in the art" is not a sufficient reason to support a rejection for lack of adequate written description."

The arguments presented by the Examiner fail to establish the prima facie case required to sustain a §112 first paragraph rejection for a single claim in at least three ways:

1. <u>No claim limitation(s) at issue have been identified.</u> The Examiner has expressed vague

concerns regarding the specification but no specific claim limitations have been identified as being at issue;

2. No evidence has been presented. As noted above, rejection under §112 first paragraph requires a preponderance of evidence and express findings of fact. In spite of this, no facts have been identified and no evidence has been presented about a specific concern regarding the specification; and

3. Relevant evidence has been ignored. Evidence that the Examiner has apparently ignored includes the summary of claimed subject matter and the declaration submitted in support of this application. Although the expert providing the declaration has considerable expertise in the development of network models, the Examiner has chosen to ignore this declaration (see page 62)

Since the prima facie case to support the claim rejections has not been established, no rebuttal is required.

Reason #2 - The second reason claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are patentable is that the specification and drawings enable any person skilled in the relevant arts to make and use the invention defined by the rejected claims. The Appellant believes that the description of the support for claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 contained in the "Summary of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings enable each of the rejected claims. This assertion is completely supported by the declaration under Rule 132 that has been provided as part of this response (pages 49 - 51, Evidence Appendix). Since the prima facie case to support the claim rejections has not been established (see reason 3 below), no rebuttal is required. However, it is worth noting that a declaration under Rule 132 completely rebuts the allegations made regarding alleged written description deficiencies "...*I have concluded that it would be straightforward for anyone to duplicate the system for evaluating cash flow and elements of a business enterprise as claimed using the information in U.S. Patent Application 09/761,670 together with the patent it cross-references*" (see page 51, Evidence Appendix).

The assertion that the specification provides adequate support for each of the rejected claims is further supported by the summary under reason 3 that makes it clear that the instant application clearly identifies the specific way in which network models are developed using concrete procedures and reliable sources of information.

Reason #3 - The third reason the claims are patentable is that the written description of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents - an apparent violation of 35 USC 3. It is well known to those of average skill in the art that the three facets of stable network model development that are most troublesome are: collecting data in a computer readable format, determining the network structure and selecting the parameters for learning. The tables below contain a comparison of some of the support for these

three areas in the instant application with some of the support found in an issued patent for (strategic capability) network models.

Network element	Instant Application	U.S. Patent 6,249,768
Data Collection	System dedicated to collection and preparation of transaction data from management systems. (see FIG.1 reference numbers 200 and 300, FIG. 5A reference numbers 201 - 210, 212 and 213; FIG. 5B reference numbers 221 - 230, 232 and 235; FIG. 6 reference numbers 306 - 310, 312, 313, 315 – 317 and line 6, page 17 through the end of page 40)	Within the SCN framework we expect to integrate the beliefs, expert opinions, and measurable data in a way that aids the formulation and analysis of a firm's strategy. (see page 69, Evidence Appendix C21, L 67 – C22, L 2)
Network structure: 1st layer nodes and 2nd layer nodes	Number of first layer nodes equal to arithmetic combination of: elements of value identified by user and/or sub elements identified analytically + 2. Each 1st layer node represents an element of value or sub element of value (see Table 23, page 46). Number of second layer nodes = number of first layer nodes + 1. Each second layer node represents a hidden node (see Table 23, page 46).	First layer nodes are resources, second layer nodes are capabilities, "from a given core capability, the modeler needs to identify the capabilities directly supported by it. Support may be either positive (enhancing) or negative (conflicting). Then for each of these capabilities, the same process has to be repeated. As discussed above, a capability identified in a previous step may need to be split into multiple capabilities when it turns out that there are multiple types of outcomes from that capability... This process continues until the tangible firm assets and resources are identified and linked to the capabilities they support. (see page 69 & 70 Evidence Appendix C 20, L 53 – C21, L 1)
Network structure: 3rd layer nodes	One node – represents revenue, expense, capital change or cash flow (see FIG 9).	Value propositions 101 appear at the top level. These are the major groupings of value that the firm offers. As a group, they may represent a unique offering to the market. General examples are: low cost, high quality, and customer convenience. (see page 70 Evidence Appendix C12, L 11 – 14)

Network element	Instant Application	U.S. Patent 6,249,768
Network structure: Node connection weights – layer 1 to layer 2 and Node connection weights – layer 2 to layer 3	Direction and weight determined analytically, and nodes from layer 1 connect to all nodes from layer 2, all nodes from layer 2 connect to the layer 3 node (see line 30, page 46 through line 27, page 49 and FIG. 9).	Relationships as depicted within this framework are not necessarily completely deterministic or even necessarily observable. They encompass all cause and effect linkages that are observable and all cause and effect linkages that a management team believes to exist. (see page 70 Evidence Appendix C21 L46 – 51)
Learning parameters	Network models are trained using the general procedure outlined in a number of places including (see L 30, page 46 through L 27, page 49)	In some areas, these attributes are objectively observable or measurable. In other cases, we must rely on more subjective individual or collective experience. (see page 67 Evidence Appendix C9, L 9 – 15)

Summarizing the information in the tables, the instant application clearly identifies the specific way in which network models are developed using concrete procedures and reliable sources of information. By way of contrast, the issued network model patent relies on subjective beliefs and impressions for input data, network structure, model development and results. It is important to note that the Appellant is not stating that patent 6,249,768 is not valid. The Appellant only makes the comparison shown above to illustrate the point that the above referenced application is not being reviewed under the same standard for written description that has been used for the review and allowance of other, similar patent applications..

Reason #4 - The fourth reason that claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78, claim 79, claim 80, claim 81, claim 82, claim 83, claim 84, claim 85 and/or claim 86 are patentable is that the assertions regarding the alleged lack of enablement in the written description are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. In Dickinson v. Zurko, 119 S. Ct. 1816, 50 USPQ2d 1930 (1999), the Supreme Court held that the appropriate standard of review of PTO findings are the standards set forth in the Administrative Procedure Act ("APA") at 5 U.S.C. 706 (1994). The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Appellant respectfully submits that the arguments presented by the Examiner fail to meet both standards. As detailed in the preceding paragraphs, these arguments fail under the substantial evidence standard because vague allegations do not constitute evidence of a written description deficiency under the current statutes.

The Appellant also respectfully submits that a review of the prosecution history of this application and other related appeals makes it clear that any reliance on the written description rejections presented by the Examiner would also fail under the second standard of the APA – the arbitrary and capricious standard. Under that standard, the reviewing court analyzes whether a rational connection exists between the agency's factfindings and its ultimate action. There are several reasons that the written description rejections presented by the Examiner fail under this standard:

1. There is no rational connection between the agency's findings that the Tulskie invention that relies on subjective data in a subjectively determined network structure to reach subjectively determined results has an adequate written description and the written description rejection of this application where each step for producing concrete results is clearly described.

2. Patents are documents that teach those of average skill in the art how to make and practice an invention. Understanding how to make and practice an invention includes understanding how to properly combine an invention with other inventions. In KSR v Teleflex the Supreme Court has stated that those of average skill in the art can identify and make these combinations without a motivation, teaching or suggestion. Conversely, the inability to identify a proper combination of patents provides evidence that the individual or organization proposing the combination(s) lacks a level of skill in the art that is at least the average level required to make meaningful comments regarding a written description or claim.

3. In the process of developing the agency's fact-findings for the instant application the Examiner has been unable to identify a specific claim limitation at issue, has made several consecutive, unsuccessful attempts to identify a proper combination of patents to support a plurality of claim rejections for obviousness and has been unable to explain how a single combination or modification will function in spite of having the specification available at all times to guide his hindsight. Given these facts and 2) above, there is no rational connection between the agency's factfindings and the decision to allow this examiner to author rejections for a written description or claim.

4. In the process of developing the agency's fact-findings for the instant application and related appeals TC 3600 has made over forty consecutive, unsuccessful attempts* to identify a proper combination of patents to support a plurality of claim rejections for obviousness in spite of having the specification available at all times to guide their hindsight. Given these facts and 2) above, there is no rational connection between the agency's factfindings and the decision to allow this Technology Center to author rejections for a written description.

   * the Bielinski – Brown combination is included in the list of unsuccessful attempts as Bielinski teaches that VBM uses SVA principles with three exceptions. Three of the SVA principles (three determinants of market value, efficient market and tree based analysis) teach away from the Brown combination. As is well known to those of average skill in the art the sigmoid function of the neural net would also destroy ability of the tree analysis to function.

In short, the agency's factfindings make it clear that the decision to allow the Examiner and Technology Center to issue written description rejections for these claims would also fail under the arbitrary and capricious standard.

Issue 7 - Whether the invention described in claims claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51 and claim 52 represents patentable subject matter under 35 USC 101?

The claims represent patentable subject matter and are patentable for at least five reasons:

1. because the Examiner has failed to establish a prima facie case of non-statutory subject matter for the rejected claims;

2. because the claimed invention produces results that are concrete, tangible and useful;

3. because the claimed invention transforms transaction data into a plurality of network models the have utility in optimizing purchasing activity, forecasting financial performance and managing enterprise operations;

4. because arguments regarding the alleged non-statutory subject matter fail to comply with the requirements of the Administrative Procedures Act and are therefore moot; and

5. the subject matter eligibility of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents, an apparent violation of 35 USC 3.

Reason #1 - The first reason claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51 and claim 52 are patentable is that the arguments presented by the Examiner fail to establish a prima facie case of non-statutory subject matter for the rejected claims. As noted in Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility *"the Examiner bears the initial burden ... of presenting a prima facie case of unpatentability." In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).* The Appellant notes that the Examiner has made general statements to the effect that:

- the claims "are not supported by either a specific and substantial asserted utility or a well established utility"; and

- "even the most detailed disclosure in the specification fails to present a method and system where the results can be replicated by others because qualitative judgments are involved in the method such that even the same practitioner seems unlikely to be able to replicate a result for the same case in multiple iterations of operating the model."

However, the Examiner has not provided any evidence to support these statements. *MPEP 2164.07 states "the examiner has the initial burden of challenging an asserted utility. Only after the examiner has provided evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence sufficient to convince one of ordinary skill in the art of the invention's asserted utility. In re Brana, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 (Fed. Cir. 1995) (citing In re Bundy, 642 F.2d 430, 433, 209 USPQ 48, 51 (CCPA 1981)).* Given the complete absence of evidence to support these assertions, the Appellant respectfully submits that the Examiner has failed to establish the required prima facie cause of non-statutory subject matter for the rejected claims.

Reason #2 - The second reason the claims are patentable is that it is clear that - taken as a whole - the claimed invention is a machine that produces results that are concrete, tangible and useful. In particular, the claimed invention produces a plurality of network models that provide specific forecasts that support the optimization of purchasing for a commercial enterprise. These models also support the evaluation of different options for improving financial performance and the valuation of certain elements of value. While no rebuttal is required to the unsupported allegations regarding difficulty in replicating the claimed functionality from an individual and organization that lacks the requisite skill in the art, it is worth noting that the specification clearly addresses the aspects of network model development that are known to be most problematic. It is well known to those of average skill in the art that the three facets of network model development that are most troublesome are: collecting data in a computer readable format, determining the network structure and selecting the parameters for learning. A review of the specification and drawings shows that all three of these facets of network model development are described in detail. The collection of data in a format suitable for use is detailed in FIG.1; FIG. 5A; FIG. 5B; FIG. 6 and line 6, page 17 through the end of page 40 of the specification. The determination of the network structure is described separately for each type of model being developed – revenue, expense, capital change or cash flow – and follows the general procedure described in line 29, page 45 through line 29, page 46 (in particular, see Table 23, page 46). Finally, the parameters for learning are clearly defined and the network models are trained using the general procedure outlined in line 30, page 46 through line 27, page 49.

Reason #3 - The third reason the claims are patentable is that the claimed invention is a machine for transforming transaction data into a different state: a plurality of network models of real world enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that *"data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id*. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id*. Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, real world utility for the transformed data produced by the claimed invention. The second and third reasons taken together make it clear that the claimed invention is a machine that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Reason #4 - The fourth reason the claims are allowable is that the unsupported allegations used to support the claim rejections are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. In Dickinson v. Zurko, 119 S. Ct. 1816, 50 USPQ2d 1930 (1999), the Supreme Court held that the appropriate standard of review of USPTO findings of fact are the standards set forth in the Administrative Procedure Act ("APA") at 5 U.S.C. 706 (1994). The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Supreme Court has defined substantial evidence as "substantial evidence is more than a mere scintilla. It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. . . Mere uncorroborated hearsay or rumor does not constitute substantial evidence. Consolidated, 305 U.S. at 229-30 (citations omitted)". The Assignee respectfully submits that the instant Office Action fails to provide even a scintilla of evidence to support the allegation of non-statutory subject matter it contains and that as a result it fails to meet the substantial evidence standard. The Assignee respectfully submits that the arguments presented by the Examiner also fail to pass the arbitrary and capricious test. Under the arbitrary and capricious test a reviewing court analyzes only whether a rational connection exists between the agency's fact findings and its ultimate action, (see Hyundai Elecs. Indus. Co. v. ITC, 899 F.2d 1204, 1209, 14 USPQ2d 1396, 1400 (Fed. Cir. 1990). The Assignee rejection of claims 43 – 46 and 48 – 52 also fails to pass the arbitrary and capricious test because the Examiner has not completed any discernible fact finding that can be rationally or irrationally connected to the rejection contained of these claims.

Reason #5 - The fifth reason that claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51 and claim 52 are patentable is that the subject matter eligibility of the instant application is apparently being reviewed under a different standard than that used for the review of similar patents - an apparent violation of 35 USC 3. As discussed previously under issue 6, an issued network model patent (U.S. Patent 6,249,768) relies heavily on the subjective beliefs and impressions from individuals for each step of model construction and development (see issue 6 tables and page 67 & 70 Evidence Appendix C9, L 9 – 15 and C21 L46 – 51). By way of contrast, the instant application clearly identifies the specific way in which network models are constructed using concrete procedures and reliable sources of information (see issue 6 tables). The Appellant only makes the comparison shown above to illustrate the point that the above referenced

application <u>is not being reviewed under the same standard</u> for subject matter eligibility that has been used for the review and allowance of other, similar patent applications.

Issue 8 - Whether the invention described in claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66 represents patentable subject matter under 35 USC 101?

The claims are patentable for several reasons.

<u>Reason #1</u> - The first reason the claims are patentable is that it is clear that - taken as a whole - the claimed invention is a method that produces results that are concrete, tangible and useful. In particular, the claimed invention produces a plurality of network models that provide specific forecasts that support the optimization of purchasing activity for a commercial enterprise. These models also support the evaluation of different options for improving enterprise financial performance and the valuation of certain elements of value. While no rebuttal is required to the unsupported allegations regarding the alleged difficulty in replicating the claimed functionality, it is worth noting that the specification clearly addresses the aspects of network model development that are known to be most problematic (see reason 2, issue 7 for more discussion).

<u>Reason # 2</u> - The second reason the claims are patentable is that the claimed invention is a process for transforming transaction data into a different state: a plurality of network models of real world enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that *"data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id*. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id*. Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, real world utility for the network models produced by the claimed invention. The first and second reasons taken together make it clear that the claimed invention is a process that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

<u>Reasons #3 – 5</u> - The claims are also patentable in view of the shortcomings in the arguments contained in the arguments presented by the Examiner that were detailed in issue 7 and the usefulness of the results produced by the claimed invention. In particular claims 54 - 66 are also allowable for the first, fourth and fifth reasons advanced under Issue 7.

Issue 9 - Whether the invention described in claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 represents patentable subject matter under 35 USC 101?

The claims are patentable for several reasons.

<u>Reason #1</u> - The first reason the claims are patentable is that it is clear that - taken as a whole - the claimed invention is an article of manufacture that produces results that are concrete, tangible

and useful. In particular, the claimed invention produces a plurality of network models that provide specific forecasts that support the optimization of purchasing activity for a commercial enterprise. These models also support the evaluation of different options for improving financial performance and the valuation of certain elements of value. While no rebuttal is required to the unsupported allegations regarding the alleged difficulty in replicating the claimed functionality, it is worth noting that the specification clearly addresses the aspects of network model development that are known to be most problematic (see reason 2, issue 7 for more discussion).

Reason #2 - The second reason the claims are patentable is that the claimed invention is an article of manufacture for transforming transaction data into a different state: a plurality of network models of real world enterprise financial performance. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that *"data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id*. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id*. Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, real world utility for the network models produced by the claimed invention. The first and second reasons taken together make it clear that the claimed invention is an article of manufacture that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Reasons #3 – 5 - The claims are also patentable in view of the shortcomings in the arguments contained in the arguments presented by the Examiner that were detailed in issue 7 and the usefulness of the results produced by the claimed invention. In particular claims 67 - 79 are also allowable for the first, fourth and fifth reasons advanced under Issue 7.

Issue 10 - Whether the invention described in claim 80, claim 81, claim 82, claim 83 and claim 84 represents patentable subject matter under 35 USC 101?

The claims are patentable for several reasons.

Reason #1 - The first reason the claims are patentable is that it is clear that - taken as a whole - the claimed invention is a method that produces results that are concrete, tangible and useful. In particular, the claimed invention produces a single database with data integrated from plurality of sources. This database supports processing for enterprise level analysis, optimization and management.

Reason # 2 - The second reason the claims are patentable is that the claimed invention is a process for transforming transaction data into a different state: a single database with data integrated from plurality of sources. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6)*. In Alappat, the Court held that *"data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373*. In Arrhythmia, the Court held *"the*

transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id. Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility (see In re Comiskey, No. 2006- 1286). The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, real world utility for the database produced by the claimed invention. The first and second reasons taken together make it clear that the claimed invention supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Reasons #3 – 5 - The claims are also patentable in view of the shortcomings in the arguments contained in the arguments presented by the Examiner that were detailed in issue 7 and the usefulness of the results produced by the claimed invention. In particular claims 80 - 84 are allowable for the first, fourth and fifth reasons advanced under Issue 7.

Issue 11 - Whether the invention described in claim 85 and claim 86 represents patentable subject matter under 35 USC 101?

The claims are patentable for several reasons.

Reason #1 - The first reason the claims are patentable is that it is clear that - taken as a whole - the claimed invention is a method that produces results that are concrete, tangible and useful. In particular, the claimed invention produces a model of current operation financial performance for a commercial enterprise that supports the identification of the dynamic characteristics and behavior of each element of value. Those of average skill in the art will recognize the value of this information in managing enterprise operations and financial performance.

Reason #2 -The second reason the claims are patentable is that the claimed invention is a process for transforming transaction data into a different state: a plurality of statistics that are then transformed into a model of current operation financial performance for a commercial enterprise. As noted in the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility "the Supreme Court noted that one example of a statutory "process" is where the process steps provide a transformation or reduction of an article to a different state or thing (Diehr, 450 U.S. at 183, 209 USPQ at 6).* In Alappat, the Court held that *"data, transformed by a machine" "to produce a smooth waveform display" "constituted a practical application of an abstract idea." State Street, 149 F.3d at 1373.* In Arrhythmia, the Court held *"the transformation of electrocardiograph signals" "by a machine" "constituted a practical application of an abstract idea." Id.* Likewise, in State Street, the Court held that *"the transformation of data" "by a machine" "into a final share price, constitutes a practical application of a mathematical algorithm." Id.* Thus, while Diehr involved the transformation of a tangible object - curing synthetic rubber - the Court also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity. It is the Appellant's understanding that the PTO views this "data transformation" test as an appropriate way to evaluate subject matter eligibility. The Appellant also notes that in addition to passing the data transformation test, the specification and claims define a specific, real world utility for the model of current operation financial performance produced by the claimed invention. The first and second reasons taken together make it clear that the claimed invention is a process that supports a practical application with substantial, specific utility and is therefore statutory subject matter.

Reasons #3 – 5 -The claims are also patentable in view of the shortcomings in the arguments

contained in the arguments presented by the Examiner that were detailed in issue 7 and the usefulness of the results produced by the claimed invention. In particular claims 85 - 86 are allowable for the first, fourth and fifth reasons advanced under Issue 7.

Issue 12 - Whether claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 are indefinite under 35 USC 112, second paragraph?

Claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 are patentable for at least four separate reasons:

1) the arguments presented by the Examiner fail to establish a prima facie case that would support a written description rejection under 35 USC 112 second paragraph for a single claim,

2) the arguments the Examiner has used to support a written description rejection under 35 USC 112 second paragraph fail to comply with the requirements of the Administrative Procedures Act and are therefore moot,

3) the claims of the instant application are apparently being reviewed under a different standard than that used for the review of claims in similar patents, an apparent violation of 35 USC 3, and

4) the specification and drawings clearly define the metes and bounds of each claim.

Reason #1 - As mentioned previously, the first reason that claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79, are patentable is that the Examiner has failed to establish a prima facie case that the claims are indefinite under §112 second paragraph. MPEP 2173.02 states that: d*efiniteness of claim language must be analyzed, not in a vacuum, but in light of:*

(A) The content of the particular application disclosure;

(B) The teachings of the prior art; and

(C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. See, e.g., Solomon v. Kimberly-Clark Corp., 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000). See also In re Larsen, No. 01-1092 (Fed. Cir. May 9, 2001)

The arguments presented by the Examiner fail to establish the prima facie case required to sustain a §112 second paragraph rejection in at least two ways:

1. The rejections rely on an unreasonable assertion that individuals with skill in the art of mathematical modeling would be confused by a claim containing a network model description that mirrors the formal definition of a network. More specifically, a review of the prior art shows that the description of the network models in the rejected independent claims (43, 54 and 67) mirrors the formal definition of a network:

More formally, a network contains a set of objects (in mathematical terms, nodes) and a mapping or description of relations between the objects or nodes. The simplest network contains two objects, 1 and 2, and one relationship that links them. Nodes 1 and 2, for example, might be people, and the relationship that links them might be "are standing in the same room."

The formal network definition was previously provided by the Appellant (see page 74, Evidence Appendix). Most of the remaining claims (claim 44, claim 45, claim 48, claim 50, claim 51, claim 52, claim 55, claim 56, claim 60, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 68, claim 69, claim 73, claim 75, claim 76, claim 77, claim 78 and claim 79) serve only to add limitations or structure to these network model claims so it is also unreasonable to assert that there would be any confusion regarding their scope. The other dependent claims: claim 46, claim 49, claim 57, claim 58, claim 59, claim 61, claim 70, claim 71, claim 72, claim 74 add easily understood activities to the independent claims so it would also be unreasonable to assert that there would be any confusion regarding their scope.

2. There is no evidence that a person of ordinary skill in the pertinent arts would have any confusion about the scope of any of the claims. As described above, establishing a prima facie case that would support an indefiniteness claim rejection requires that a person skilled in relevant art(s) would have difficulty understanding the metes and bounds of the claims after reviewing the specification, drawings, prior art and the claims.

In an apparent attempt to demonstrate that there is confusion, the Examiner has made comments regarding the claims for the instant application. However, these comments are moot because there is substantial evidence that the Examiner lacks the requisite skill in the relevant art(s) to make meaningful statements in this regard. As noted previously under issue 2 and issue 3, the Examiner has been unable to identify a workable combination of patents and/or to explain the combinations of patents he has proposed to support obviousness rejections in spite of written requests that he do so. Patents are documents that teach those of average skill in the art how to make and practice an invention. The fact that the Examiner cannot identify workable combinations of patents or explain the combinations of patents that he is proposing provides evidence that the Examiner does not possess the average level of skill in the relevant arts required to make meaningful comments regarding a claim. The Examiner has attempted to explain his inability to account for the combinations he has proposed by stating that there is no requirement to explain combinations for applications that have been classified as business methods (see page 60 Evidence Appendix). To date the Examiner has not cited any statute or binding decision that supports this statement in spite of requests that he do so. His explanation also overlooks the fact that at least some of the pending claims are misclassified as business methods.

Additional evidence that the Examiner lacks the requisite skill in the relevant arts that would enable him to provide meaningful comments on a written description or patent claim includes:

a) the Examiner's explanation of the reasoning that guided his decision to combine Sandretto with Jost to support the rejection of some claims was that "computer systems hardware and software are extremely flexible" (see 60 Evidence Appendix). This explanation provides evidence that the Examiner's skill in the art is such that he does not understand that

differences in a number of things including: operating principles, methods, architecture and/or priorities may limit flexibility and prevent the combination of different software programs and/or hardware systems;

b) the Examiner's refusal to consider a declaration that was provided as part of a response to a prior Office Action (see page 61 Evidence Appendix). The instant application teaches that the performance of real world elements of value such as brands, customers and vendors can be used to model and explain changes in aspects of the financial performance of a commercial enterprise. The declaration the Examiner refused to consider was provided by a scientist with expertise in modeling the performance of real world entities (see pages 49 – 51 Evidence Appendix). The scientist is employed at one of the U.S. government's most prestigious research laboratories. The Examiner's refusal to consider the declaration raises a question as to whether or not the Examiner understands the invention he is evaluating. This is particularly true since the Examiner has not explained why the fact that the dependent variables in the claimed invention for modeling the impact of real world entities are easily identified financial measures should diminish the value of the expert's considerable experience in creating mathematical models (including network models) of real world entities;

c) the Examiner has been unwilling or unable to identify the arts that are relevant to each of the different claims; and

d) the Examiner feels that claims for network models that mirror the formal definition of a network are indefinite.

It is important to note that the Appellant asked the Examiner to provide evidence that he did possess the requisite skill in the art but he chose not to provide any of the requested information.

As part of these rejections the examiner has stated that claim 54 is a single step claim and that claims 52, 65 and 78 lack antecedent basis. A simple review of the claims shows that both of these assertions have no merit.

Reason #2 - The second reason that claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 are patentable is that the assertions regarding the alleged indefiniteness of the claims are not in compliance with the requirements of the Administrative Procedures Act and are therefore moot. In Dickinson v. Zurko, 119 S. Ct. 1816, 50 USPQ2d 1930 (1999), the Supreme Court held that the appropriate standard of review of PTO findings are the standards set forth in the Administrative Procedure Act ("APA") at 5 U.S.C. 706 (1994). The APA provides two standards for review – an arbitrary and capricious standard and a substantial evidence standard. The Appellant respectfully submits that the arguments presented by the Examiner fail to meet both standards. As detailed in the preceding paragraphs, the arguments presented by the Examiner fail under the substantial evidence standard because vague allegations from an individual (and/or organization) that lack the required skill in the art(s) do not constitute evidence of a lack of definiteness in any of the claims under the current statutes. The Appellant also respectfully submits that a review of the prosecution history of this application makes it clear that any reliance on the § 112 second paragraph rejections presented by the Examiner would also fail under the second standard of the APA – the arbitrary and capricious standard. Under that standard, the reviewing court analyzes whether a rational connection exists between the agency's factfindings and its ultimate action. One of the reasons the claim indefiniteness rejections presented by the Examiner would fail under the arbitrary and capricious standard is: patents are documents that teach those of average skill in the art how to make and practice an invention; after identifying a number of patents that contain some of the same words

used in the instant application, the Examiner has proposed several unworkable combinations of patents and has been unable explain how the combinations of patents that he has proposed would work – these failures provide substantial evidence that the Examiner does not possess the level of skill in the art required to make meaningful comments regarding a written description and/or a claim for a pending patent application. In short, the agency's factfindings make it clear that the decision to allow this Examiner to issue a §112 second paragraph rejection for these claims also fails under the arbitrary and capricious standard.

Reason #3 - As noted previously, the third reason claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and/or claim 79 are patentable is that the definiteness of the claims in the instant application are apparently being reviewed under a different standard than that used for the review of similar patents - an apparent violation of 35 USC 3. For example, U.S. Patent 6,249,768 has an allowed claim for using a network models that states:

> 6. A method for analyzing a firm, comprising the steps of: generating a strategic capability network which connects present resources of said firm through present capabilities of said firm to present value propositions of said firm, said strategic capability network having nodes and relationships between said nodes, each said node being a capability, a resource or a strategic position, each said relationship being directional and being characterized by a degree of support from a supporting one of said nodes to a supported one of said nodes, said degree of support being dependent upon said present resources, said present capabilities and said present value propositions;….

As discussed previously under issue 6, the specification for 6.249,768 appears to present considerable ambiguity concerning the resources, capabilities and value propositions. This is because in many cases it is apparently necessary to rely on subjective individual or collective experience to identify them (see page 68 & 69 Evidence Appendix C20, L 53 – C21, L 51). Relationships between these elements of the network are similarly hazy as they are not necessarily completely deterministic or even necessarily observable (see page 66 Evidence Appendix C9, L 9 – 15). It is worth noting that Harhen teaches that when information used to build a network model is obtained from a variety of individuals it is necessary to incorporate a sophisticated reconciliation system in order to obtain useful results. By way of contrast, the input, hidden and output nodes in the network models of the instant application are all completely identified and the weights (which quantify relationships) are determined with precision using a novel method for generating network models for managing enterprise performance. The Appellant only makes the comparison to illustrate the point that the above referenced application is not being reviewed under the same standard for claim indefiniteness that has been used for the review and allowance of other, similar patent applications.

Reason #4 - As noted previously, the fourth reason claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79, are patentable is that the specification and drawings clearly enable any person skilled in the relevant arts to understand the metes and bounds of the rejected claims. The Appellant believes that the description of the support for claim 43, claim 44, claim 45, claim 46, claim 48, claim 49, claim 50, claim 51, claim 52, claim 54, claim 55, claim 56, claim 57, claim 58, claim 59, claim 60, claim 61, claim 62, claim 63, claim 64, claim 65 and claim 66, claim 67, claim 68, claim 69, claim 70, claim 71, claim 72, claim 73, claim 74, claim 75, claim 76, claim 77, claim 78 and claim 79 contained in the "Summary

of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings clearly and completely describe the metes and bounds of each claim.

Since the prima facie case to support the claim rejections has not been established, no rebuttal is required. However, it is worth noting that a declaration under Rule 132 (pages 49 - 51, Evidence Appendix) completely rebuts the allegations that the claims are indefinite as it states that:
"U.S. Patent Application 09/761,670 together with the patent it cross-references fully describes: 1) A framework system (claim 43 and associated claims 44-46 and 48-52); 2) A firm analysis method (claim 54 and associated claims 55-66); 3) A computer readable media for firm analysis (claim 67 and associated claims 68-79) "(see page 50, Evidence Appendix*).*

Issue 13 - Whether claim 80, claim 81, claim 82, claim 83 and/or claim 84 are indefinite under 35 USC 112, second paragraph?

The claims are patentable for several reasons.

Reason #1 - The first reason claim 80, claim 81, claim 82, claim 83 and/or claim 84 are patentable is that there is no evidence that the prior art, specification and/or drawings do not enable any person skilled in the relevant arts to understand the metes and bounds of the rejected claims.   Since the prima facie case to support the claim rejections has not been established, no rebuttal is required. However, it is worth noting that the declaration under Rule 132 completely rebuts the allegations that the claims are indefinite as it states that: *"U.S. Patent Application 091761,670 together with the patent it cross-references fully describes: ... 4) An enterprise data integration method (claim 80 and associated claims 81-84); "* (see pages 50 – 51, Evidence Appendix).

Reasons #2 – 4 - The claims are also patentable in view of the shortcomings in the arguments presented by the Examiner that were detailed in issue 12. In particular claim 80, claim 81, claim 82, claim 83 and/or claim 84 are also allowable for the second and third reasons advanced under issue 12. The Appellant also believes that the description of the support for claim 80, claim 81, claim 82, claim 83 and/or claim 84 contained in the "Summary of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings clearly and completely describe the metes and bounds of each claim.

Issue 14 - Whether claim 85 and/or claim 86 are indefinite under 35 USC 112, second paragraph?

The claims are patentable for several reasons.

Reason #1 - The first reason claim 85 and/or claim 86 are patentable is that there is no evidence that the prior art, specification and/or drawings do not enable any person skilled in the relevant arts to understand the metes and bounds of the rejected claims.   Since the prima facie case to support the claim rejections has not been established, no rebuttal is required. However, it is worth noting that the declaration under Rule 132 completely rebuts the allegations that the claims are indefinite as it states that: *"U.S. Patent Application 09/761,670 together with the patent it cross-references fully describes: ... 5) An intelligent method for analyzing commerce data using a computer (claim 85 and associated claim 86). "* (see pages 50 – 51, Evidence Appendix).

Reasons #2 – 4 - The claims are also patentable in view of the shortcomings in the arguments presented by the Examiner that were detailed in issues 6 and 12 and the usefulness of the results produced by the claimed invention. In particular claim 85 and/or claim 86 are also allowable for the second and third reasons advanced under issue 12. The Appellant believes that the description of the support for claim 85 and/or claim 86 contained in the "Summary of Claimed Subject Matter" section of this appeal brief makes it clear that the specification and drawings clearly and completely describe the metes and bounds of each claim.
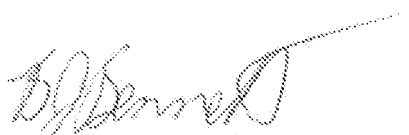
Conclusion

Finally, the Appellant notes that with respect to the prosecution of the instant application, it appears that the U.S.P.T.O. has not fully complied with the requirements set forth in the APA, 35 USC 3 and 3 and 35 USC 131. Among other things, the Appellant specifically notes that:

a) at least some of the claims appear to be misclassified under class 705;

b) there appears to have been repeated violations of MPEP 904.03;

c) the Examiner refused to enter the references from an information disclosure statement submitted in accordance with the requirements of 37 CFR 1.97. These references contain evidence re: the patentability of the pending claims. The excluded information disclosure statement has a format identical to that of 10 pages of references for this application previously accepted, reviewed and entered by the Examiner;

d) there is no evidence that a declaration from an expert with a background relevant to the instant application has been considered while the Examiner was allowed to enter rejections under 35 USC 112 first and second paragraph in spite of what appears to be substantial evidence that the Examiner and the Technology Center lack the skill in the art required to make meaningful statements in this regard. As a result, relevant information was ignored while irrelevant information was entered into the record;

e) the fact that KSR vs Teleflex has reduced the amount of written description required to support an invention by raising the level of skill in the art that can reasonably be expected from those reading a specification and practicing an invention has not been considered; and

f) the written description, subject matter eligibility, prior art and claims of the instant application appear to have been reviewed under a different standard than that used for the review and allowance of a similar application.

As detailed above, the evidence used to support the art rejections of the pending claims consists of an improper modification and two improper combinations of documents. There is also no evidence to support the non-art rejections of the pending claims. At the same time, evidence that supports the patentability of the rejected claims has been excluded while the fact that at least some of the claims are misclassified and the fact that there appears to be a lack of the required skill in the art has been arbitrarily excluded or ignored. For these reasons and the extensive reasons detailed above, the Appellant respectfully but forcefully contends that each claim is patentable. Therefore, reversal of all rejections is courteously solicited.

Respectfully submitted,

B. J. Bennett, President, Asset Trust, Inc.

Dated: October 22, 2007

CLAIMS APPENDIX

43. A framework system, comprising:

a computer with a processor having circuitry to execute instructions; a storage device available to said processor with sequences of instructions stored therein, which when executed cause the processor to:

obtain a plurality of data related to a value of a business enterprise in a format suitable for processing,

evolve a plurality of network models for connecting one or more elements of value of said firm to one or more aspects of financial performance of said firm, said network models being further comprised of:

input nodes, hidden nodes and output nodes where each input node represents an element of value and each output node represents an aspect of financial performance; and

a plurality of relationships between said nodes, each said relationship being characterized by a degree of influence from one node to another; said degree of influence being dependent upon an impact of the element of value represented by said node and its interrelationship with other elements of value

where each network model from a plurality of network models supports the development of a controlling forecast for use in optimizing purchasing.

44. The framework system claimed in claim 43 where one or more aspects of financial performance are selected from the group consisting of revenue, expense, capital change, market value and combinations thereof.

45. The framework system of claim 43 wherein a network model further comprises:

a summary of value drivers by element of value applied to each of said input nodes, where said summaries summarize the impact of each of said elements of value on one or more aspects of financial performance, the other elements of value and combinations thereof.

46. The framework system of claim 43 further comprising means for training a best fit network model that identifies a relative impact of each element of value on each component of value where the weights from the best fit models are used to identify the relative contribution of each element of value to each component of value net of any impact on the other elements of value.

48. The framework system claimed in claim 43 where a plurality of relationships are quantified for a specified point in time within a sequential series of points in time.

49. The framework system of claim 43 where a relative contribution to the components of value are combined with the present value of said components of value to determine a current operation value of each element of value where the components of value are selected from the group consisting of revenue, expense, capital change and combinations thereof.

50. The framework system of claim 43 where an element of value is selected from the group consisting of brands, customers, employees, and combinations thereof.

51. The framework system of claim 43 where a plurality of network models further comprise a plurality of neural network models that are trained using genetic algorithms.

52. The framework system of claim 43, wherein a plurality of network models further comprise a plurality of business event network models.

54. A firm analysis method, comprising:

aggregating firm related data from a plurality of systems in accordance with a common data dictionary

using at least a portion of the data to generate a plurality of network models which connect one or more current elements of value of said firm to one or more aspects of financial performance of said firm, said network models being further comprised of:

one or more input nodes, hidden nodes and output nodes where each input node represents an element of value and each output node represents an aspect of financial performance, and

a plurality of relationships where each relationship is a function of an impact of each element on other elements of value or an aspect of financial performance;

where each network model from a plurality of network models supports the development of a controlling forecast for use in optimizing purchasing.

55. The method of claim 54 where one or more aspects of financial performance are selected from the group consisting of revenue, expense, capital change, market value and combinations thereof.

56. The method of claim 54 wherein said network models further comprise:

a summary of value drivers by element of value applied to each of said input nodes, where said summaries summarize the impact of each of said elements of value on one or more aspects of financial performance, the other elements of value and combinations thereof.

57. The method of claim 54 where one or more weights from a best fit model are used to identify a net impact of each element of value on a component of value selected from the group consisting of revenue, expense, capital change and combinations thereof.

58. The method of claim 54 further comprising training one or more best fit network models that identify a relative impact of each element of value on each of the components of value where one or more weights from the best fit models are used to identify a relative contribution of each element of value to each component of value net of any impact on the other elements of value.

59. The method of claim 58 further comprising training one or more best fit network models using one or more genetic algorithms.

60. The method of claim 54 where a plurality of relationships are quantified for a specified point in time within a sequential series of points in time.

61. The system of claim 54 where a relative contribution to one or more components of value is combined with a present value of said components of value to determine a current operation value of each element of value.

62. The method of claim 54 where one or more elements of value are selected from the group consisting of brands, customers, employees, and combinations thereof.

63. The method of claim 54 where network models further comprise neural network models.

64. The method of claim 54 where a firm is a product, a group of products, a division or a company.

65. The method of claim 54 wherein a plurality of network models further comprise a plurality of business event network models.

66. The method of claim 54 where firm related data includes data captured from the group consisting of a basic financial system, a human resource system, an advanced financial system, a sales system, an operations system, accounts receivable system, accounts payable system, capital asset system, inventory system, invoicing system, payroll system,. purchasing system, the Internet and combinations thereof.

67. A computer readable medium having sequences of instructions stored therein, which when executed cause the processor in a computer to perform a firm analysis method, comprising:

    integrating business related data for a firm using a common dictionary,

    using at least a portion of the data to generate a plurality of network models which connect one or more elements of value of said firm to one or more aspects of financial performance of said firm, said network models being further comprised of:

        one or more input nodes, hidden nodes and output nodes where each input node represents an element of value and each output node represents an aspect of financial performance and a plurality of relationships where each relationship is a function of the impact of each element on other elements of value or an aspect of financial performance

        where each network model from a plurality of network models supports the development of a controlling forecast for use in optimizing purchasing.

68. The computer readable medium of claim 67 where one or more aspects of financial performance are selected from the group consisting of revenue, expense, capital change, market value and combinations thereof.

69. The computer readable medium of claim 67 wherein a network model further comprises:

    a summary of value drivers by element of value applied to each of said input nodes, where said summaries summarize the impact of each of said elements of value on one or more aspects of financial performance, the other elements of value and combinations thereof.

70. The computer readable medium of claim 67 where one or more weights from a best fit model are used to identify a net impact of an element of value on revenue, expense and capital change.

71. The computer readable medium of claim 67 where the method further comprises:

    training a best fit network model to identify a relative impact of an element of value on a component of value where one or more weights from the best fit model are used to identify a

relative contribution of each element of value to a component of value net of any impact on the other elements of value.

72. The computer readable medium of claim 71 where the method further comprises: using one or more genetic algorithms to train a best fit network model.

73. The computer readable medium of claim 67 where the relationships are quantified for a specified point in time within a sequential series of points in time.

74. The computer readable medium of claim 67 where the relative contributions to the components of value are combined with the present value of said components of value to determine the current operation value of each element of value where the components of value are revenue, expense and capital change.

75. The computer readable medium of claim 67 where the elements of value are selected from the group consisting of brands, customers, employees, and combinations thereof.

76. The computer readable medium of claim 67 where the network models are neural nets.

77. The computer readable medium of claim 67 where the firm is a product, a group of products, a division or a company.

78. The computer readable medium of claim 67 wherein a plurality of network models further comprise a plurality of business event network models.

79. The computer readable medium of claim 67 where firm data includes data captured from the group consisting of a basic financial system, a human resource system, an advanced financial system, a sales system, an operations system, accounts receivable system, accounts payable system, capital asset system, inventory system, invoicing system, payroll system, purchasing system, the Internet and combinations thereof.

80. An enterprise data integration method, comprising:
    accessing a plurality of enterprise transaction data via an interface coupled to a plurality of data sources,
    converting said transaction data to a common schema using an application software segment, and
    storing said converted data in a database for use in processing,
      where a plurality of sources further comprise database management systems for systems

selected from the group consisting of a basic financial system, a human resource system, an advanced financial system, a sales system, an operations system, an accounts receivable system, an accounts payable system, a capital asset system, an inventory system, an invoicing system, a payroll system, a purchasing system and combinations thereof.

81. The method of claim 80 wherein a plurality of sources further comprise a plurality of relational databases where said databases use different data formats.

82. The method of claim 80 wherein an interface further comprises a network connection.

83. The method of claim 80 wherein a common schema further comprises a network schema and said common schema contains a common data dictionary where said common data dictionary defines common attributes selected from the group consisting of elements of value, components of value, currencies, units of measure, time periods, dates and combinations thereof.

84. The method of claim 80 wherein the method further comprises completing a conversion and storage of data before processing begins.

85. An intelligent method for analyzing commerce data using a computer, comprising:

    identifying a set of data required for analyzing a commercial enterprise,

    preparing the identified set of data for use in analysis,

    analyzing at least a portion of said data in an automated fashion as required to identify one or more statistics selected from the group consisting of pattern, trend, ratio, average, elapsed time period, percentage, variance, monthly total and combinations thereof, and

    using at least a portion of said statistics and data to develop a model of enterprise current operation financial performance using automated learning

      where the model mathematically expresses the dynamic characteristics and behavior of each element of value as including direct effects and indirect effects from each element of value.

86. The method of claim 85 wherein the method further comprises using a plurality of genetic algorithms to automatically learn from the data by using processing steps selected from the group consisting of fitness measure re-scaling, random mutation, recalibrating target fitness levels, selective crossover, selective carry-forward and combinations thereof.

Evidence Appendix

Pages 49 – 51   declaration under rule 132, received September 10, 2006

Pages 52 – 56   excerpt from Sandretto (5,812,988)

Page   57   excerpt from Jost (5,361,201)

Pages 58 – 59   excerpt from Barr (5,761,442)

Page   60   excerpt from Office Action mailed May 9, 2006

Page 61 - 62   excerpt from Office Action mailed January 3, 2007

Pages 63 - 66   Noisy Market Hypothesis, received September 10, 2006

Pages 67 – 70   excerpt from Tulskie (6,249,768) entered April 14, 2006

Pages 71 – 72   excerpt from Bunte (5,873,070)

Page   73   excerpt from Harhen (5,406,477) entered April 14, 2006

Page   74   excerpt from Supplemental Amendment received January 31, 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant :   Jeff S. Eder

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Art Unit ::   3628

Examiner :   Siegfried Chencinski

Docket No. :   AR - 16

Customer No. :   53787

DECLARATION UNDER RULE 132

I, Rick Rauenzahn, do hereby declare and say:

My home address is 529 Calle don Leandro, Espanola, New Mexico 87532; I have a B.S. degree in chemical engineering from Lehigh University, an S.M. degree in chemical engineering from The Massachusetts Institute of Technology and a Ph.D. in chemical engineering from The Massachusetts Institute of Technology;

I have worked in the mathematical modeling field for 25 years, concentrating in the disciplines of fluid mechanics, turbulence modeling, numerical methods for partial differential equations, radiation hydrodynamics, and strength of materials. I also have extensive knowledge of computer system administration, particularly for Windows-based, Linux, and Unix systems; I have been employed by Los Alamos National Laboratory and Molten Metal Technologies for the past 23

years.

I further declare that I do not have any direct affiliation with the application owner, Asset Reliance, Inc. I met the inventor for the first time in April 2006. While I joined the Technical Advisory Board for Knacta, Inc., a company run by the inventor in May of 2006. I have not attended a meeting or completed any assignments for the Technical Advisory Board as of the date of this declaration. I have never discussed this patent application or any of the other patent applications owned by Asset Reliance with the inventor or anyone else. Knacta, Inc. has a license to the intellectual property associated with this application.

On August 2, 2006 I was given a copy of U.S. Patent Application 09/761,670 entitled "A method of and system for evaluating cash flow and elements of a business enterprise" filed in the United States Patent Office on January 18, 2001. Until that time I had not read the patent application. I have studied the entire specification in order to closely analyze the claims and drawings. I am totally familiar with the language of the claims and conversant with the scope thereof. I completely understand the invention as claimed.

Based on my experience and training in the field of mathematical modeling and electronic data processing, I have concluded that it would be straightforward for someone of average skill in the art to duplicate the system for evaluating cash flow and elements of a business enterprise as claimed using the information in U.S. Patent Application 09/761,670 together with the patent it cross-references.

Specifically, U.S. Patent Application 09/761,670 together with the patent it cross-references fully describes:

1) A framework system (claim 43 and associated claims 44-46 and 48-52);
2) A firm analysis method (claim 54 and associated claims 55-66);
3) A computer readable media for firm analysis (claim 67 and associated claims 68-79);
4) An enterprise data integration method (claim 80 and associated claims 81-

84); and

5) An intelligent method for analyzing commerce data using a computer (claim 85 and associated claim 86).

Based on these and other considerations, it is my professional opinion that U.S. Patent Application 09/761,670 together with the patent it cross-references would enable someone of average skill in the relevant arts to recreate and practice a method of and system for evaluating cash flow and elements of a business enterprise as claimed.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Signed,

/Rick M. Rauenzahn/

Rick Rauenzahn
Date: September 4, 2006

United States Patent [19]

Sandretto

[11] **Patent Number:** 5,812,988

[45] **Date of Patent:** Sep. 22, 1998

[54] **METHOD AND SYSTEM FOR JOINTLY ESTIMATING CASH FLOWS, SIMULATED RETURNS, RISK MEASURES AND PRESENT VALUES FOR A PLURALITY OF ASSETS**

[75] Inventor: **Michael J. Sandretto**, Granger, Ind.

[73] Assignee: **Investments Analytic, Inc.**, Granger, Ind.

[21] Appl. No.: **418,111**

[22] Filed: **Apr. 6, 1995**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 162,540, Dec. 6, 1993, abandoned.

[51] **Int. Cl.**^{6} **H01J 13/00**

[52] **U.S. Cl.** **705/36**; 395/235; 395/236; 364/408; 364/407; 364/401; 705/35; 705/10

[58] **Field of Search** 395/236, 235; 364/408, 407, 401; 700/36, 35; 705/35, 36, 10

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*Primary Examiner*—Amelia Au
Attorney, Agent, or Firm—Foley & Lardner

[57] **ABSTRACT**

Methods and apparatus for: (1) inputting economic variables expected to influence future asset values and asset-specific variables; (2) estimating financial statements, future asset values, and tentative asset NPVs using estimated economic variables and estimated asset-specific variables; (3) estimating different financial statements, future asset values and current asset NPVs assuming different estimates of the economic variables that affect asset values; and (4) processes to: (a) equate; or (2) reduce to acceptably small numbers the differences between: (i) the risk measures, terminal values, default premiums, and risk premiums used to determine current values, and (ii) risk measures, terminal values, default premiums, and risk premiums implied by the estimates of economic and firm-specific variables.

23 Claims, 13 Drawing Sheets
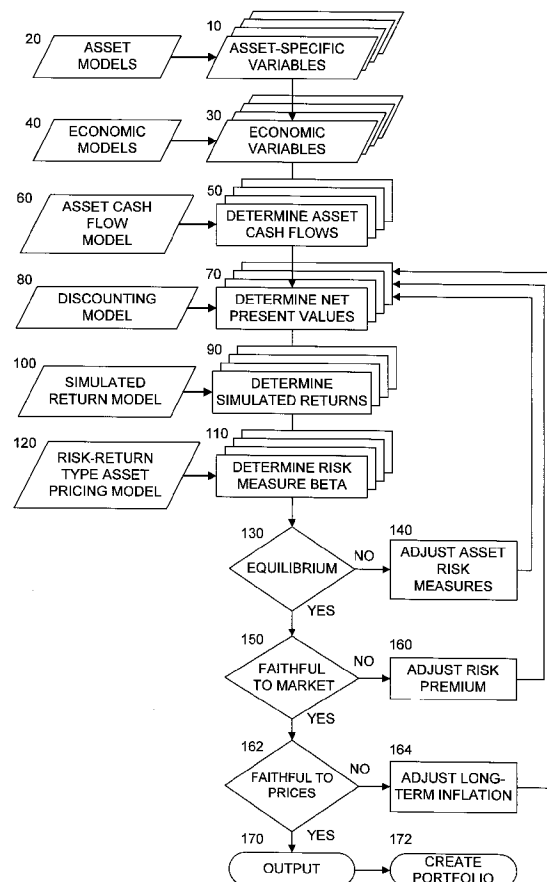
METHOD AND SYSTEM FOR JOINTLY ESTIMATING CASH FLOWS, SIMULATED RETURNS, RISK MEASURES AND PRESENT VALUES FOR A PLURALITY OF ASSETS

This application is a continuation-in-part of application Ser. No. 08/162,540, filed Dec. 6, 1993, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to computer implemented processes for estimating simulated returns, asset values and risk measures using estimated financial variables pertaining to an asset, such as economic variables and asset-specific characteristics.

2. Description of Related Art

There are numerous publications directed to financial risk analysis. Some of these papers will be referenced in the discussion below.

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Financial analysts, investors, business persons, brokers, investment bankers, and others (hereinafter analysts) routinely estimate asset values. Such assets include, but are not limited to: equipment, real estate, debt instruments (e.g., bonds or notes), portions of companies, entire companies, and common stock or other classes of securities issued by companies or of other asset classes or derivatives of asset classes issued by investment firms.

Many known processes exist for estimating asset values. They can broadly be grouped as: (1) value-based processes, and (2) earnings or cash-flow based processes.

Value-based processes usually estimate values for an asset's separable parts. One value based process estimates the current market selling prices of an asset's separable parts. For example, if an owner receives a purchase-offer for an entire firm, one test of the reasonableness of the offer is whether a higher price can be obtained by selling the firm's separable parts. Another value-based process begins with original purchase prices for a firm's individual assets. Each asset's original cost is then adjusted for usage and estimated price changes since the acquisition date.

In contrast, earnings or cash-flow based valuation processes attempt to value an asset's projected future earnings or future cash-flows (the two are not equivalent, but estimated future earnings are often used to estimate future cash flows). Those processes usually apply the rule that a dollar today is worth more than a dollar in the future. Each asset's estimated earnings or cash flows are discounted at some rate (interest rate or discount rate) to determine the asset's current value, also referred to as present value or net present value (NPV). The cash flow/earnings valuation process consists of three separate and distinct parts: (1) estimate an asset's future earnings, cash flows, or earnings and cash flows; (2) estimate the discount rate (statistical methods and experience-based estimates are commonly used); and (3) discount the estimated future earnings or cash flows at the discount rate.

This invention deals with the earnings or cash-flow class of valuation processes, and therefore the balance of this background relates to such processes. It is highly preferable to discount estimated cash flows rather than to discount estimated earnings. The present invention may, however, be applied to either method.

There are many ways to estimate an asset's future earnings and future cash flows. Analysts typically estimate

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revenues and costs associated with an asset. An analyst may estimate that during the following year a firm's revenue will be $10,000,000 while its expenses will be $9,000,000. Those estimates, when combined, yield an estimated income of $1,000,000. A firm's projected investments and financing can be combined with income projections to estimate cash flows.

Estimated revenues, costs, and cash flows often depend on predicted economic conditions such as economy-wide or industry-specific growth rates, interest rates, specific price changes, and general inflation. There are countless ways to estimate economic variables and combine them with asset-specific assumptions to estimate an asset's earnings and cash flows. To an extent, the choice of an estimating process is a matter of personal preference, although some processes are more appropriate for particular asset classes. Further, the particular process is often less important than is an analyst's skill and effort. Although many processes are available to estimate an asset's earnings and cash flows, they may be misapplied by unskilled analysts.

As will be understood, an important feature of this invention is that it may be advantageously practiced with a wide range of earnings and cash-flow estimating processes. More specifically, this invention relates to an iterative process to estimate a discount rate for each of two or more assets. This invention relates to similar iterative processes to estimate other variables or coefficients that are useful in estimating an asset's risk or NPV. These include: (1) a risk premium for a class of assets based on the assumption that, in aggregate, that class of assets is correctly (efficiently) priced in the market; (2) an estimate of the implied long-run inflation rate used to value bonds or other assets; (3) a coefficient to estimate a firm's terminal value; (4) a risk premium or premiums for one or more asset classes based on the risk premium or premiums for one or more other asset classes; (5) a default premium for one or more specific debt issues; and (6) a general iterative process of additional variables.

Of the mentioned variables, most prior art has focused on estimating discount rates. Prior art relating to the additional five variables is either based on ad hoc rules, or on methods that are similar to prior art processes used to estimate discount rates. As will be evident, such prior art processes bear little relation to this invention regarding the additional five variables.

It is possible to estimate an asset's discount rate using qualitative judgment. For example, an analyst may wish to value a small firm at a time when 30-day U.S. Treasury bills pay a 6% annual interest rate. This rate is often referred to as the risk-free interest rate for two reasons. First, there is so little chance the U.S. Government will default that, for practical purposes, default risk is zero. Second, the interest-rate risk (a bond declines in value if interest rates rise) is very low because the bill matures in 30 days. The NPV of a Treasury bill is determined by discounting the principal payment back to the present, but the discount period is so short (30 days) that changes in the discount rate have little effect on a 30-day Treasury bill's value. Thus, for practical purposes, a 30-day Treasury bill is free of both default risk and interest-rate risk.

An analyst may use qualitative judgment to decide that when a risk-free investment pays a 6% return, an investment in the small firm should earn 14% because of numerous risks, including: (1) the firm's value may decline because of a recession; (2) the firm may be unable to compete with larger firms because it lacks technical expertise; or (3) the firm may be unable to obtain needed financing.

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The judgment-based rate of 14% can be used to discount estimated future cash flows. Expected cash flows one year in the future would be divided by 1.14; expected cash flows two years in the future would be divided by 1.14^2, while expected cash flows three years in the future would be divided by 1.14^3.

In practice, many analysts do use judgment to estimate discount rates and many are highly successful investors and managers. Other analysts prefer a more objective process. The prior art development that has had by far the most significant influence on the field of finance was independently developed by William Sharpe and John Lintner in 1964 and 1965. That prior art developed a theoretical mathematical relation between an asset's risk and its return (on investment). The resulting risk-measure can be used to determine an asset's discount rate. The theoretical relation between an asset's risk and return is known in the prior art finance literature as the Sharpe-Lintner capital asset pricing model (CAPM):

$$(1) \ E(\tilde{R}_i) = R_f + \beta_i \times [E(R\tilde{R}_m) - R_f]$$

for i=1 . . . N, where n is an integer equal to the number of assets, and

where:

$E(\tilde{R}_i)$=the expected value of the return from investing in asset i

R_f=the return from investing in a risk-free asset (typically 30-day U.S. Treasury bills)

β_i=the risk measure for firm i

$E(\tilde{R}_m)$=the expected value of the return from investing in the market (typically the expected return to investing in some market index, such as the New York Stock Exchange [NYSE] Index™, or the S&P 500 Index)

Because current methods are unable to estimate the expected value of the returns for investing either in an individual asset or in an index, in practice the CAPM is implemented using the following version of equation (1):

$$(2) \ R_{it} = R_{ft} + \beta_i \times (R_{mt} - R_{ft})$$

where:

R_{it}=the actual return from investing in asset i during a prior period t

R_{mt}=the actual return from investing in the market portfolio during a prior period t

R_{ft}=the actual risk-free rate during a prior period t

β_i=the slope coefficient derived by regressing R_{it} against R_{mt}

a simplified version, sometimes referred to as the market model, is sometimes substituted for equation (2) because in practice there is little difference between the two:

$$(3) \ R_{it} = \beta_i \times R_{mt}$$

From its inception this simple linear model has been the basis for what is by far the most extensive body of academic research in the field of finance, which includes thousands of academic and applied or practical articles in the fields of finance, economics, and accounting. The CAPM is also widely used in the practice of business and finance. In both academic studies and in practice, the model is often used to estimate the risk of common stocks and possibly less often to estimate the value of common stocks. Typically the statistical method of linear regression is used to estimate an asset's risk as follows:

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decades. As mentioned, that research probably led to only minor improvements in the quality of risk measures estimated using either the CAPM or the APT. Recently finance researchers are spending relatively more time on how risk measures change over time.

One method of avoiding changes in the risk measure is to estimate risk over the same period during which the model is tested (concurrent periods; sometimes referred to as leapfrogging). That is, the risk measure (CAPM) or measures (APT) are estimated using regression on alternate months (assume even months); those risk measures are then used to test the ability of the model to predict returns during the odd months for that particular asset. As with prior implementations of the CAPM and APT, the results indicate a weak relation between predicted and actual returns.

Another method uses statistical analysis on previous operating, financing, and accounting information. The coefficients determined through that process are used to estimate an asset's current risk given its current operating, financing, and accounting information. That estimated risk measure is sometimes averaged with a statistically estimated β based on historical returns. Because of the numerous variables that can be used, and because the process usually involves complex statistical methods, the process is subjective, difficult to implement, and difficult to interpret. The results have not been particularly successful.

In addition to these applied methods of estimating an asset's NPV, there are theoretical methods based on calculus that currently are applied to what are best described as hypothetical assets (because they are far more simple than real assets). Grossman and Stiglitz, among others, use a methodology, usually called the equilibrium approach, although sometimes called state contingent or rational expectation methodology. As an example of a hypothetical asset used by this class of methods, an asset might earn a return of 15 percent when economic conditions are favorable and 4 percent when they are unfavorable. Although it is entirely possible to construct an actual financial asset that would pay its owner such returns, in practice these assets do not exist. These models currently appear to be used only in theoretical articles because they cannot be applied to the types of assets that exist in practice given the existing level of development of the closed form calculus methodology. A September, 1992, article by Longstaff and Schwartz attempts to value extremely simple, yet real, bonds using closed form methods, but is limited to using two input variables, as opposed to this claimed invention, which can utilize an almost unlimited number of input variables using a non closed form method. Pearson and Sun (1994) used closed-form methods to test what is known as the Cox-Ingersoll-Ross model (1985) on actual Treasury bonds. Pearson and Sun reject the model as being unable to explain Treasury prices.

The advantage of equilibrium models is that they do not rely on prior asset or index returns. Economic and asset-specific parameters are specified in such a way that there exists a mathematical solution for the value of the assets. As mentioned, these methods have not been used to value actual assets found in the current market and do not involve risk-return type asset pricing models.

Although there is voluminous academic and applied literature in the prior art, there is limited prior patent art. IBM Technical Disclosure Bulletin (April 1971; literature and foreign patent section; U.S. Class 364, Subclass 408) describes a program to determine the rate of return and the cost of government subsidy for real estate investments. The process also provides an iterative procedure for finding the

rent that must be charged to obtain a given rate of return. The iterative process in the IBM bulletin appears to be simply a way to determine what is known as the internal rate of return. It is a process well-known in the prior art since the 1950s. It bears almost no relation to this claimed invention.

U.S. Pat. No. 3,270,170 to Lambert (Aug. 30, 1966) describes an apparatus for evaluating the capital appreciation potential of investments and for predicting future prices of common stock. Lambert discloses (in 1962 before the CAPM's development) a linear model of the relation between stock prices and variables such as: earnings, dividends, asset values, and trading volume. The process apparently uses linear regression of prior stock prices against prior values of the previously-mentioned variables. The resulting regression coefficients are multiplied by predicted values for each of the mentioned variables. The result is a predicted price for common stock. The process does not adjust for risk, does not consider the effect of the mentioned variables on risk, and involves no numerical processes other than simple linear regression and multiplication.

Lambert's process is very different from the present invention because the present invention: (1) does not use coefficients for the types of variables specified in Lambert's invention, (2) does not directly use regression on past values of any variables although regression on prior values may be used indirectly to estimate inputs to this claimed invention; (3) to the extent that the present invention uses predicted values for the types of variables specified in Lambert's invention (e.g., earnings and dividends), it uses them in a discounting process, not in a process whereby they are multiplied by coefficients from regressions on prior values to determine current asset values; and (4) some of the variables used as input to Lambert's process (e.g., prior stock prices and trading volume) need not be used in the present invention application because the models are so dissimilar.

U.S. Pat. No. 4,989,141 to Lyons et al. (Jan. 29, 1991) describes a database process that classifies, stores, and retrieves data that can be used for financial analysis and reporting. Although Lyons et al. could potentially be used as input to the present invention, Lyons et al. does not estimate asset risk or NPV.

U.S. Pat. No. 4,953,085 to Atkins (Aug. 28, 1990) describes a process that selects investments to maximize returns subject to: (1) existing tax laws; (2) investor risk-preferences; and (3) forecasts of economic and financial variables. In particular, the Atkins invention seeks to optimize the allocation of an individual's funds between investments and mortgage payments. The Atkins invention estimates neither asset risk nor asset NPV.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method and apparatus to estimate an asset's risk and NPV that, instead of using prior-period returns to estimate risk: (1) estimates an asset's operating, financing and accounting characteristics, (2) estimates general and sector economic relations, and (3) estimates certain current economic conditions, such as interest rates, and to create a portfolio based on the estimated asset risk and NPV.

It is another object of the present invention to provide a method and apparatus for creating a portfolio by: (1) estimating an initial set of cash flows for each asset in a set of two or more assets using known or conventional methods; (2) generate additional estimated cash flows based upon different estimates for one or more economic variables; (3) adjust the original set of cash flows and each additional set of cash flows for expected inflation; (4) determine an initial

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input risk measure for each asset based on a risk-return type asset pricing model; (5) determine an initial discount rate for each asset using the initial input risk measure for each asset and using different economic variables that relate to each set of cash flows (for example, the risk-free rate and the market risk premium which are typically different for each set of cash flows); (6) discount the inflation-adjusted cash flows at the discount rate to determine a present value for each set of cash flows; (7) use the present values to determine simulated returns for each asset; (8) use the simulated returns for each asset to determine at least one simulated market index return; (9) regress simulated asset returns against simulated market returns or else use division to determine an output risk measure for each asset; (10) use the resulting output risk measure for each asset to estimate a new input risk measure and; (11) repeats steps **1** through **10** (or **4** through **10** in some implementations) in an iterative process until, for each asset, the output risk measure approximates to within desired accuracy the input risk measure used to determine the most recently iterated discount rate.

It is a further object of this invention to provide a method and apparatus to combine the previous iterative process with an iterative process that adjusts the estimated risk premium for a group or class of assets until the estimated total value of those assets approximates their total market value.

It is a further object of this invention to provide a method and apparatus to combine one or more of the previous iterative processes with an iterative process that adjusts the long-run inflation rate until the estimated value of individual assets is close to the actual market prices for those individual assets.

It is a further object of this invention to provide a method and apparatus to estimate the risk premium for one or more assets groups based on the risk premium for a different group of assets.

It is a further object of this invention to provide a method and apparatus to estimate the default premium for debt.

It is a further object of this invention to provide a method and apparatus to estimate the terminal value of an asset.

These and other objects of the invention are accomplished by providing a data processing system that jointly estimates: future cash flows under varying economic conditions; simulated returns; risk; and value for a set of two or more assets. The process of the present invention differs from the prior art, inter alia, in that it may be successfully carried out based upon as few as the following three inputs: (1) estimated economic variables, such as projected interest rates, inflation rates, economy-wide growth rates, and segment growth rates, with an option to include: (a) correlations between economic variables, and (b) specifications as to how those economic variables fluctuate over time; (2) estimated operating, financing, and accounting variables for two or more assets; and (3) a risk-return type asset pricing model or models (such as the CAPM, the APT, or non-linear versions of the CAPM or APT).

A significant advantage of the present invention is that it fully utilizes current information that affects asset risk. In particular, the CAPM is traditionally considered a one factor model but this invention can use many factors in the CAPM without the complexity required by the APT. In addition, because the invention uses forecasted cash flows, it can be used for virtually any asset, including stocks, bonds, real estate, newly formed companies, bankrupt companies, derivative assets (assets derived from other assets), and potential assets, such as assets to be issued in the future. In contrast, with prior art processes the CAPM and APT are rarely used to value assets other than common stocks.

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The process begins by estimating an initial set of financial statements and cash flows for each asset (only cash flows if the asset is a bond or similar asset) for some number of periods using estimated operating, financing, accounting and economic variables an analyst has input into the process. Estimated cash flows may be also be adjusted for expected price changes, such as inflation.

The second step is to estimate additional sets of cash flows based upon the initial sets of cash flows. The additional sets of cash flows are determined by using a different estimate for at least one of the economic variables. By way of example, five additional sets of cash flows for each asset may be determined by using five additional sets of estimates for the economic variables. Thus, in this example, there will be a total of six sets of cash flows for each asset (the initial estimate and five additional estimates), where each set of cash flows for an asset may show, for example, estimated quarterly cash flows for the following ten years.

As should be evident, there are several different ways to carry out the second step of the invention. According to one embodiment of the invention, the initial estimates for economic variables, which were used to generate the initial set of cash flows, are revised 5 times as of the date the initial forecast is made (instantaneous changes to the initial and subsequent forecasts) or five times as of some later date, such as 30 days later so as to correspond with the period of the risk-free 30-day Treasury bill. By way of example, suppose that the process is being run as of Feb. 1, 1993, and that an analyst's best estimate is that industrial production will grow by 3% annually (thus, expected industrial growth is one economic variable in this example. It is expected to influence the cash flows of some of the assets, which may be, by way of example, firms producing industrial goods.). The initial growth rate economic variable estimate of 3% may be used to generate an initial set of cash flows for each asset. Next, five revised growth rates, such as, for example, 2.8%, 3.3%, etc., which may be pseudo-randomly generated by a computer using estimated distributions for each economic variable, may be used to generate five additional different sets of cash flows for each asset. Thus, the original growth estimate and the five revised growth estimates are used to generate six sets of estimated cash flows for each of the assets.

The third through sixth steps of the process of the present invention determine a NPV for each of the sets of cash flows for each asset. In the third step cash flows are adjusted for expected inflation. Inflation-adjusted cash flows an investor would receive from each asset (e.g., dividends and terminal value or principal and interest payments) are then discounted by each asset's discount rate. Since, at least initially, the discount rate is unknown, the fourth step is to determine an initial estimate of each asset's risk measure (β). The fifth step is to determine each asset's discount rate based upon the initial estimate of that asset's risk measure β, the risk-free rate and the market risk premium. In the sixth step, an NPV is determined for each asset for each of the six sets of estimated cash flows by discounting the inflation-adjusted cash flows from step three by the discount rates from stop five (typically different discount rates for the initial set of cash flows and for each of the five additional sets of cash flows for each of the assets in the portfolio). In subsequent iterations of the process, a new set of discount rates for each of the assets is determined based upon a new and updated risk measure, β, determined in subsequent steps in this process. The third through sixth steps and the following steps of the process are repeated until the risk measure β used in this step to determine the discount rate approximates

REAL ESTATE APPRAISAL USING PREDICTIVE MODELING

CROSS-REFERENCE TO RELATED APPLICATION

The subject matter of this application is related to the subject matter of pending U.S. application Ser. No. 07/814,179, for "Neural Network Having Expert System Functionality", by Curt A. Levey, filed Dec. 30, 1991, the disclosure of which is incorporated herein by reference.

The subject matter of this application is further related to the subject matter of pending U.S. application Ser. No. 07/941,971, for "Fraud Detection Using Predictive Modeling", by Krishna M. Gopinathan et al., filed Sep. 8, 1992, the disclosure of which is incorporated herein by reference.

37 C.F.R.1.71 AUTHORIZATION

A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office records, but otherwise reserves all copyright rights whatsoever.

BACKGROUND OF THE INVENTION

1. Field Invention

This invention relates generally to real estate appraisals and sales price predictions. In particular, the invention relates to an automated real estate appraisal system and method that uses predictive modeling to perform pattern recognition and classification in order to provide accurate sales price predictions.

2. Description of Related Art

The "appraised value" of a real estate parcel, or property, comprises some estimate of the full market value of the property on a specified date. A property's appraised value is of great importance in many types of real estate transactions, including sales and loans.

Conventionally, appraised value is determined by a professional appraiser using both objective and subjective factors. One disadvantage of such a method is the difficulty in ensuring that the appraiser conducts a neutral, unbiased analysis in arriving at the appraised value. This difficulty is often compounded by the fact that the appraiser may be retained and paid by an interested party in the contemplated transaction, such as a lender, mortgage broker, buyer, or seller.

In order to reduce bias and provide more accurate appraisals, statistical techniques may be used to obtain an independent, consistent, mathematically derived estimate of a property's value to assist an appraiser in generating an appraised value. Traditional statistical techniques, such as multiple linear regression and logistic regression, have been tried, but such techniques typically suffer from a number of deficiencies. One deficiency is the inability of traditional regression models to capture complex behavior in predictor variables resulting from nonlinearities and interactions among predictor variables. In addition, traditional regression models do not adapt well to changing trends in the data, so that automated model redevelopment is difficult to implement.

One example of the difficulty of applying a regression model to appraisal problems is the uncertainty as to the optimal temporal and geographical sample size for model development. A model developed using all homes in one square city block might theoretically be an effective predictor for that particular neighborhood, but it may not be possible to develop such a model with sufficient stability and reliability, due to the relatively small sample size. On the other hand, a model developed using all homes sold in the United States in the past month might have a sufficiently large sample size, but might be unable to capture local, neighborhood characteristics to provide an accurate appraisal. Thus, a significant deficiency of traditional regression modeling techniques when applied to real estate appraisals is the inability to successfully model neighborhood characteristics while including a sufficiently large sample size to develop a robust, stable statistical model.

It is desirable, therefore, to have an automated system that uses available information regarding real estate properties to provide accurate estimates of value. Preferably, such a system should be flexible enough to allow model development in a relatively small geographic area, it should be able to handle nonlinearities and interactions among predictor variables without advance specification, it should have high predictive accuracy, and it should have capability for redevelopment of the underlying system model as new patterns of real estate pricing emerge.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an automated system (100) and method for real estate appraisals, which uses one or more predictive models such as neural networks (908) to generate estimates of real estate value. The predictive models (908) generate these estimates based on learned relationships among variables describing individual property characteristics (905). The models (908) also learn relationships between individual property characteristics (905) and area characteristics (906). Area characteristics (906) are stored and applied at a level of geographic specificity that varies according to the amount of data available at each of several successively larger geographic areas. In this way the models (908) are able to capture local neighborhood characteristics without unduly reducing sample sizes, which would reduce reliability and predictability.

The learned relationships among individual property characteristics (905) and area characteristics (906) enable the system (100) to estimate the value of the property being appraised. Error models (909) may also be provided to generate an estimated value range or error interval for the sales price. The appraised value and error estimate may then be provided as output (907) to a human decision-maker, along with other related information such as: reason codes that reveal the relative contributions of various factors to the appraised value; and various measures of market trends. Finally, the system (100) periodically monitors its performance, and redevelops the models (908,909) when performance drops below a predetermined level.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an implementation of the present invention.

FIG. 2 is a sample data entry screen that forms part of a typical input/output interface for the present invention.

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PREDICTIVE NEURAL NETWORK MEANS AND METHOD FOR SELECTING A PORTFOLIO OF SECURITIES WHEREIN EACH NETWORK HAS BEEN TRAINED USING DATA RELATING TO A CORRESPONDING SECURITY

FIELD OF INVENTION

The present invention relates to a financial data processing system and method designed for investors whose objective is to obtain a return on their investment portfolio which is superior to the broad index benchmarks of a given capital market. More particularly, the system and method of this invention are preferably carried out using artificial neural networks capable of estimating the appreciation potential of the individual securities in a capital market. The system of this invention uses the appreciation estimates for the individual securities to create and administer investment portfolios with varying time horizons.

BACKGROUND OF THE INVENTION

Individual and institutional investors apply various selection and optimization strategies in the process of creating a securities portfolio which can provide higher return on their capital investment. Such strategies are frequently based on research in a particular industry, historical price data for individual stocks, analysis of fundamental data, etc. A common problem in formulating an investment strategy is, however, the overwhelming amount of the available market information which cannot be readily interpreted. For this reason, investors are confined to specific techniques which rely on limited subsets of data.

For example, many investors employ a technique known as market timing, which involves investing in the equity markets at the perceived time of market growth and divesting at a later time of perceived market contraction. This strategy is usually based on timing the cycles for the market as a whole which tends to avoid the risk associated with owning individual stocks. A problem with this approach is that accurate timing of the market cycles involves, by necessity, the compression of large amounts of statistical data into analytical worksheets, graphs, bar charts or other quantitative depictions of the information so as to enable a skilled analyst to make an investment decision. Unfortunately, the compression process may obscure relevant trends in smaller subsets of data. Further problems arise if it is desired to follow the performance of foreign markets because additional information such as currency exchange rates has to be taken into account.

The advent of computerized trading and other forms of advanced information processing in recent years has created a new family of global investment products, such as commodity options; real estate and currency funds; financial futures contracts and other derivative instruments based on the underlying securities. Also, investment vehicles have been offered to track the performance of select foreign markets. A problem common to all these investment products is that in order to obtain desirable return rates, it is required to use specialized knowledge in the respective investment fields.

Among the various investment options, mutual funds which offer a variety of investment options tailored to specific customer needs have gained popularity in last few years. One such option is presented by the so-called indexed stock funds which are designed to track the performance of

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broader market benchmarks, such as the S&P (Standard & Poor's) 500 index. The S&P 500 index is a market capitalization weighted basket of the stocks of 500 large companies, indicative of the performance of the U.S. equity markets. The indexed stock funds usually invest in the stocks of the S&P 500 companies targeting their relative weights in the index and, therefore, directly track the performance of the S&P 500 index, aided by lower asset research fees and transaction costs. Such financial products offer convenience and relatively low fees but are meant to follow and match the market, not outperform it.

If the investment goal is to surpass the underlying market benchmark, the task becomes one of holding a smaller subset of all stocks of the market, such that this subset has a higher expected return and about the same level of risk as the market index. Such task requires one to focus on individual stocks and their performance in relation to the index that serves as the underlying performance benchmark. Individual stocks usually have their own unique performance characteristics. Information that is specific to a particular stock includes earnings-related data, the company's growth plans, personnel changes and the public's perception of the company. While some of these factors (such as personnel) are not readily quantifiable, others such as earnings and projections (e.g., earnings estimates and their revisions) can be quantified. Clearly, however, the relationships among such data are complicated and frequently non-linear, making them difficult to analyze. In summary, an investment decision in the modern capital markets requires processing of large volumes of data and taking into account a number of factors which may exhibit significant non-linear relationships among different components of the data.

Computers, in general, are very adept at dealing with large amounts of numerical information. However, sophisticated techniques are required to analyze and combine disparate information that can potentially impact security prices. Several expert computer systems have been deployed in the domain of finance, including some in the area of investment management.

In the past several years, neural networks ("neural nets") have become popular in solving a variety of problems ranging from protein secondary structure prediction to speech recognition. Neural nets mimic the ability of the human brain to recognize recurring patterns that are not just identical but similar. A neural net can predict the value of one variable based on input from several other variables that can impact it. The prediction is made on the basis of an inventory of patterns previously learned, seeking the most relevant in a particular situation. Unlike traditional Artificial Intelligence (AI) systems, which are rule-based, neural nets can "learn" by example and modify themselves, adjusting and adapting to changing conditions.

Several applications of neural nets to the domain of finance are already known in the art.

U.S. Pat. No. 5,109,475 to Kosaka et al. discloses a neural network for selection of time series data. This method is illustrated in a particular application to the problem of stock portfolio selection. In the first step of the proposed method, certain characteristics for each security are calculated from a time series data related to the security. The characteristics to be computed include the historical risk (variance and co-variance) and the return. The following step involves the establishment of a performance function based on the calculated characteristics and, in the third step of the method, a Hopfield neural network is used to select a subset of securities from a predefined universe. Due to the fact that the

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Kosaka system only considers historical risk and return data, and implicitly assumes that the relationship between risk and return factors will remain stable in the future, in a typical rapidly changing market environment, it is unlikely to predict accurately price variations which are subject to complicated non-linear relationships.

U.K Pat. application 2 253 081 A to Hatano et al. discloses a neural net for stock selection using only price data as input. The main idea of the proposed system is to calculate runs (sequences) of price trends, increases and decreases, using a point-and-figure chart and using the maximum and minimum values from the chart to make a time-series prediction using a neural network. As in the previous case, the Hatano system only uses historic price data which places limitation on the type and quality of predictions that may be achieved. Additionally, the use of only the external points of the price chart obscures even further information about any time dependencies that might be present in the original data.

The above-described financial systems do not fully utilize the potential of the neural nets for stock selection and optimized portfolio construction. Notably missing is the capability to take into account a combination of technical (historical price, volume, etc.) and fundamental factors (earnings, cashflow, etc.) for each security in a capital market. Investment management systems known in the art have not been able to effectively combine technical and fundamental information in a computerized framework involving data processing systems and communication networks.

SUMMARY OF THE INVENTION

It is accordingly an object of the present invention to provide a data processing system to develop and administer an investment portfolio expected to outperform, if possible, broad indices associated with domestic or foreign capital markets.

It is another object of the present invention to present an artificial neural network system for estimating the appreciation potential of each security in a capital market using both fundamental and technical information about the security.

It is yet another object of the present invention to develop a method for stock selection on the basis of appreciation potential parameters estimated using a neural network system for each stock in a given capital market.

Yet another object of the present invention is to provide a data processing system and method to create an investment portfolio subject to certain risk parameters and to rebalance the portfolio periodically to increase the expected return of the portfolio while maintaining the investment risk at a similar level.

These and other objectives are achieved in accordance with the present invention using neural networks which can be trained to make predictions of the relative performance of a stock over a predetermined period of time vis-a-vis the risk adjusted return of the corresponding market index. The use of neural nets is particularly well suited to the problem of investment decision-making because it provides the capability to capture non-linear functional relationships among input variables which are not easily modeled or captured by more traditional methods of security analysis and selection, such as multifactor models based on linear regression.

Specifically, in the preferred embodiment, each stock in the capital market is tracked by an individual neural net which receives input signals representing both fundamental and technical information about the stock. Fundamental information includes earnings-related data about the stock

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while technical information includes price-derived data about the stock and the various market indices. The fundamental and technical information about each stock, appropriately organized, is used as a predictor or indicator of the future performance of the stock. (For example, one such indicator is the volatility of the stock returns over a select period of time). The neural net is input a set of indicators corresponding to a snapshot in time. Each of these indicators is derived using a lookback period, thus encoding a memory effect for each input. The network is trained using different sets of inputs (and corresponding outputs), tested on two different sets of data (termed test set and validation set) and then used to make forecasts using current market data. The type of indicators and the process of selecting values to be used as input data to the neural nets are determined by factors such as how far ahead the system is forecasting (its time horizon), the presence of periodicities in the data and the correlation between the indicator and the performance of the stock, the indices of the capital market, etc.

Following the selection of input indicators, each neural net is trained with the available historical data. The training process continues until at least one stopping criterion is met. Such criteria include the determination that the connections between the nodes of the net have reached a steady state, that the error between the predicted output and the actual target values is less than a certain threshold, or that a predefined time period has elapsed without any improvement in the net's performance. Once the neural nets for each stock of the capital market have been trained and tested on the available historical data, in accordance with the preferred embodiment of the present invention, the neural nets are used to make a prediction of the appreciation potential of each stock.

In a suitable time interval, such as one week, the appreciation potentials of the stocks in the capital market are recomputed and the neural nets are trained again using the historical data plus the newly available data. Each week the trained networks estimate the appreciation potential of the stocks 1, 2, . . . , M weeks ahead, so that comparing earlier overlapping estimates to available data about the stocks can provide a measure of how good each appreciation estimate is.

The system of the present invention correspondingly comprises means for choosing the appropriate input data which consists of a set of price-derived indicators as well as earnings-based rankings; means for pre-processing the data into appropriate categories and inputs; means for training the neural networks; means for determining the end of the training process; and means for accessing the appropriate data and making predictions for a given time period.

The appreciation potential of each stock determined by the neural nets is used to generate an optimized investment portfolio comprising a selected number of stocks. Each stock is allocated a weight based on its estimated performance potential within the prescribed future time period and other parameters related to the investment risk. These weights form the basis of both long and short portfolios. The "long" portfolio includes a prespecified number of stocks which are estimated to have the best appreciation potential. Conversely, the "short" portfolio includes stocks which are estimated to have the worst performance potential for the predetermined time period. An investor utilizing the system of the present invention may then make investment decisions (such as buying or selling stocks) on the basis of the suggested model portfolios.

More specifically, the portfolio of stocks is created in accordance with the present invention using a portfolio

1355-59. This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103. See id. at 1344-45." In re Kahn, Slip Op. 04-1616, page 9 (Fed. Cir. Mar. 22, 2006)." (**Bolding added**).

In this case, the examiner made a judgement that the ordinary practitioner of the art, had he or she seen the Sandretto and Jost references at the time of Applicant's invention, would have seen the teachings, suggestions and obviousness of selectively using the disclosures of the two references in order to develop the features and limitations of claims 52, 63 and 76. Sandretto and Jost both present computer automated applications. Modifying the software and even the hardware employed to operate Sandretto's disclosure with additional software and perhaps additional hardware to add the neural networks teaching by Jost is eminently doable in the computer arts. The practitioner would have had the knowledge and skill to achieve the combinations through employment of appropriate hardware and software manipulations. The examiner's judgement is based on the judgement that the ordinary practitioner in this kind of invention is either solely competent in finance and strategic evaluations of the firm and is sufficiently knowledgable to get the computer implementation done, or is sufficiently competent in working with one or more collaborating practitioners, assistants or a vendor who have the required computer related knowledge and skills. The details of these computer techniques are outside the scope of this examination and are not claimed. The rational underpinning for this judgement is based on the fact that computer systems hardware and software are extremely flexible, unlike many scientific and technical areas of art where that is not the case. For example, an invention employing a gasket with certain required stiffness characteristics to achieve a certain performance quality cannot have prior art applied to it based on a flexible gasket. Many court opinions are based on such specific factual scenarios where the technical facts may have been misunderstood by an examiner. The examiner is not required to give a technical exposition of how the ordinary practitioner would apply his technical know-how regarding computer systems, since this has been classified as a business methods application. Rather, the burden of proof falls on applicant to present a reasonable case to disprove the examiner's judgement. This requirement is supported by the following

DETAILED ACTION

Information Disclosure Statement

1.   The information disclosure statement filed September 10, 2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609, particularly 1.98 (a)(3)(i) because a concise explanation of the relevance of the items submitted, including the identification of the relevant pages and lines of each IDS document, has not been submitted. The disclosed materials have been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Declaration Submitted Under Rule 132

2.   The declaration by Mr. Rick Rauenzahn submitted on September 8, 2006 under Rule 132 has been considered but has been determined to lack relevance because the qualifications submitted by Mr. Rauenzahn do not qualify him as an expert according in the art of financial modeling as required by Rule 132 since Mr. Rauenzahn does not claim to have expertise in any aspect of business and/or financial modeling and because Mr. Rauenzahn's declaration does not make any statements regarding claimed subject matter and/or claimed limitations. Mr. Rauenzahn has claims degrees in chemical engineering at the BS, Masters and PhD levels. Mr. Rauenzahn specifically claims to have experience and expertise in the disciplines of fluid dynamics, turbulence modeling, numerical methods for partial differential equations, radiation hydrodynamics, and strength of materials as an employee of Los Alamos National Laboratory and Molten Metal Technologies for 23 years.

Response to Arguments

21.   Applicant's arguments filed on September 8, 2006 with respect to claims 43-46, 48-52, and 54-86 in regard to the rejections under 35 USC 103(a) have been considered but are moot in view of the new ground(s) of rejection necessitated by Applicant's amendments of claims.

Applicant's arguments filed on September 8, 2006 with respect to claims 43-46, 48-52, and 54-86 in regard to the rejections under 35 USC 112 have been fully considered but they are not persuasive.

ARGUMENT A: Traversal of the rejections of claims 43-86 under 35 USC 101 (p. 20, l. 1 – p. 21, l. 24).

RESPONSE: The examiner has expanded the text of the 101 rejections above in response to Applicant's traversal of the rejections under 35 USC 101.

ARGUMENT B: Traversal of 35 CFR 112-1st and 2nd paragraph rejections (p. 22, l. 1 – p. 25, l. 2).

RESPONSE: The examiner has expanded the text of the 101 rejections above in response to Applicant's traversal of the rejections under 35 USC 101.

ARGUMENT C: Request for Affidavits under 37 CFR 1.104 (p. 27, l. 1 – p. 28, end) regarding the well known use of relational databases, a network schema and a data dictionary.

RESPONSE: Evidence for the well known nature of relational databases, a network schema and a data dictionary to the ordinary practitioner of the art at the time of Applicant's invention are contained in the Microsoft Computer Dictionary for relational databases and a data dictionary. Bunte et al. disclose the use of network schema in US Patent 5,873,070 (Col. 3, ll. 52, 58; Col. 6, ll. 33, 65).

Conclusion

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COMMENTARY

The 'Noisy Market' Hypothesis

By JEREMY J. SIEGEL
June 14, 2006; Page A14

Although the price-weighted Dow Jones Industrial Average approached its all-time high in early May, the large capitalization-weighted indexes -- such as the S&P 500 or the Russell 3000 -- in which most investors hold their "indexed" investments are still substantially below their tech-bloated peaks reached in March 2000. Those of us who have linked our portfolio returns to these popular indexes wonder whether there is a better way to capture the market's return without enduring the wild swings that characterized the last bubble.

Don't get me wrong. Capitalization-weighted indexation has been one of the great innovations in the last quarter-century. It has allowed millions of investors to capture the return on the market at a very small cost, and has outperformed most actively managed mutual funds. The $5 trillion invested in portfolios tracking cap-weighted indexes speaks to its popularity.

But we are on the verge of a revolution: New research demonstrates that it is possible to construct broad-based indexes offering investors better returns and lower volatility than capitalization-weighted indexes. These indexes are weighted by fundamental measures of firm value, such as sales or dividends, instead of allowing the market price alone to dictate how much of each firm should be included in the index.

Strong Appeal

The vast majority of indexes, with the exception of the Dow Jones Averages, are capitalization-weighted. This means that the weight of each stock in the index is proportional to the total market value of its shares. This methodology has strong appeal since the return on these indexes represents the aggregate or "average" return to all shareholders.

Strong support for these indexes also emanates from the academic community. The philosophical foundation of these indexes is the "efficient market hypothesis," which assumes that the price of each stock at every point in time represents the best, unbiased *estimate* of the true underlying value of the firm.

The efficient market hypothesis does not say a stock's price is always equal to its fundamental value. But the theory implies it is impossible to tell which stocks are undervalued and which are overvalued without either costly analysis or an innate skill possessed only by a chosen few, such as Warren Buffett, Peter Lynch or Bill Miller.

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It can be shown that under standard portfolio models, if stocks are priced according to the efficient market hypothesis, then capitalization-weighted indexes offer investors the best risk-return combination. And there is no doubt that capitalization-weighted portfolios have performed very well for investors. Research conducted by Jack Bogle, Charles Ellis, Burton Malkiel and myself has undeniably shown that active mutual fund managers fail, after fees, to keep pace with the market indexes.

But as indexed investing gained adherents, cracks were found in the efficient market hypothesis. In the early 1980s, Rolf Banz and Don Keim showed that small stocks earned an outsized return compared to their risks. And, earlier, Sanjoy Basu and David Dreman discovered that stocks with low price-to-earnings ratios had significantly higher returns than stocks with high P/E ratios; small stocks with low P/E ratios (small value stocks) enjoyed particularly outstanding returns. The magnitude of these size- and value-based returns could not be rationalized using the standard asset pricing models of the efficient market hypothesis.

This caused schizophrenia in the financial community. Efficient-market believers still dominate the field of financial research, but many practitioners, including moonlighting academics, recommend that investors overweight value and small stocks in their portfolios. Eugene Fama from the University of Chicago and Ken French from Dartmouth's Tuck School built a very successful investment firm based on slicing the universe of stocks into value- and size-based sectors to market to large individual and institutional investors.

Since the 1980s, the finance profession has searched in vain for the reason why small and value stocks outperformed the market. Efficient-market diehards maintain these stocks contain deeply buried risk hidden in the historical data. They predict that one day, when a crisis hits and investors critically need to liquidate their portfolios, small and value-based stocks will crumble while large growth stocks will shine.

But if this is true, the data are unfortunately moving in the wrong direction. In the past decade we witnessed a huge tech bubble, 9/11, a recession, major corporate scandals and wars in Afghanistan and Iraq -- yet not only did small and value stocks survive, they outperformed the big cap, high-priced stocks by wider margins than they had in the past.

Current attempts to explain the hidden risks in value stocks remind me of the astronomers in the 16th century who attempted to save the earth-centered Ptolemaic view of the universe. They were forced to add complicated "epicycles" to the orbits of the planets to rationalize their movements in the evening sky; the model collapsed when Copernicus showed that a simple sun-centered solar system was an easier explanation. As with Copernicus, there is now a new paradigm for understanding how markets work that can explain why small stocks and value stocks outperform capitalization-weighted indexes.

This new paradigm claims that the prices of securities are *not* always the best estimate of the true underlying value of the firm. It argues that prices can be influenced by speculators and momentum traders, as well as by insiders and institutions that often buy and sell stocks for reasons unrelated to fundamental value, such as for diversification, liquidity and taxes. In other words, prices of securities are subject to *temporary* shocks that I call "noise" that obscures their true value. These temporary shocks may last for days or for years, and their unpredictability makes it difficult to design a trading strategy that consistently produces superior returns. To distinguish this paradigm from the reigning efficient market hypothesis, I call it the "noisy market hypothesis."

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The noisy market hypothesis easily explains the size and value anomalies. If a stock price falls for reasons unrelated to the changes in the fundamental value, then it is likely -- but not certain -- that overweighting such a stock will yield better than normal returns. On the other hand, stocks that rise in price more than their fundamentals become "large stocks" with high P/E ratios that are likely to underperform.

These discrepancies are not easy to arbitrage away on a stock-by-stock basis. The noisy market hypothesis does not say that *every* stock that changes price does so by more than what is justified by fundamentals. Any particular stock may still be undervalued when it moves up in price or overvalued when it moves down.

New research indicates that there is a simple way that investors can capture these mispricings and achieve returns superior to capitalization-weighted indexes. This is through a strategy called "fundamental indexation." Fundamental indexation means that each stock in a portfolio is weighted not by its market capitalization, but by some fundamental metric, such as aggregate sales or aggregate dividends. Like capitalization-weighted indexes, fundamental indexes involve no security analysis but must be rebalanced periodically by purchasing more shares of firms whose price has gone down more than a fundamental metric, such as sales, and selling shares in those firms whose price has risen more than the fundamental metric.

Robert Arnott, editor of the Financial Analysts Journal and chairman of Research Affiliates, LLC, has published research documenting both the theoretical and historical superiority of fundamentally weighted indexes. It can be rigorously proved that if stock prices are subject to noise, then capitalization-weighted indexes will offer investors risk-and-return characteristics that are inferior to those of fundamentally weighted indexes.

I have long advocated the use of dividends in evaluating stocks. Dividends are the only fundamental variable that is completely objective, transparent and unable to be manipulated by managers who tinker with accounting assumptions. (In the interest of full disclosure, I am an adviser to a company that develops and sponsors dividend-based indexes and products.)

According to my research, dividend-weighted indexes outperform capitalization-weighted indexes and are particularly valuable at withstanding bear markets. For example, the Russell 3000 Index lost almost 50% of its value between the bull market peak of March 2000 and the October 2002 low. Over this same period, a comparable total market dividend-weighted index was virtually unchanged. A dividend weighted index did have a bear market, but it only corrected by 20%. Moreover, the dividend-weighted index bear market didn't start until March 2002, and it lasted only six months (compared to 24 months for the cap-weighted index). The dividend-weighted index is now about 40% above its March 2000 close, whereas the S&P 500 and Russell 3000 are still not yet back to even. A similar performance occurred in other bear markets.

The historical data make an extremely persuasive case for fundamental indexing. From 1964 through 2005, a total market dividend-weighted index of all U.S. stocks outperformed a capitalization-weighted total market index by 123 basis points a year and did so with lower volatility. The data indicate that the outperformance by fundamentally weighted indexes during the same period is even greater among mid-sized and small stocks.

'Value Cuts'

Furthermore, dividend-weighted indexes had better risk and return characteristics than capitalization weighted indexes in each industrial sector and each country that I analyzed.

Dividend-weighted indexes even outperformed "value cuts" of the popular capitalization-weighted indexes such as the Russell Value and Barra-S&P Value that attempt to choose those stocks whose prices are low relative to fundamentals.

With the advent of fundamental indexes, we're at the brink of a huge paradigm shift. The chinks in the armor of the efficient market hypothesis have grown too large to be ignored. No longer can advisers claim that capitalization-weighted indexes afford investors the best risk and return tradeoff. The noisy market hypothesis, which makes the simple yet convincing claim that the prices of securities often change in ways that are unrelated to fundamentals, is a much better description of reality and offers a simple explanation for why value-based investing beats the market.

If you are a fan of indexing, as I and so many other investors are, you are no longer trapped in capitalization-weighted indexes which overweight overvalued stocks and underweight undervalued stocks. Devotees of value investing who are searching for a simple, low-cost indexed portfolio in which to hold their stocks need wait no longer. Fundamentally weighted indexes are the next wave of investing.

Mr. Siegel, the Russell E. Palmer Professor of Finance at Wharton, is senior investment strategy adviser to WisdomTree Asset Management, Inc. This concludes a two-part series.

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attributes about the nodes and links, supporting computational analyses as well as aiding human reasoning and understanding.

This network depicts an explicit representation of the knowledge that might otherwise remain tacit within the firm's management. This knowledge includes: the internal capabilities and resources, the value propositions being made to the external environment, the interrelationships among them and the facts or attributes that describe these network elements in detail. In some areas, these attributes are objectively observable or measurable. In other cases, we must rely on more subjective individual or collective experience. A comprehensive view of this knowledge requires of the elicitation of the partial knowledge held by individual members of the firm management in a semantically consistent way to produce the composite picture. A formal framework for organizing the knowledge facilitates this elicitation and combination process. This process also exposes areas of conflict and consensus that allow the capture of the degree of uncertainty in the knowledge. It shows where a given decision might be based on uncertain, conflicting knowledge and is therefore, itself uncertain.

We next summarize some of the analyses enabled by the construction of a strategic capability network. The structure of the network can be analyzed to identify distinctive patterns that are noteworthy. These include: alignment—a set of capabilities that all reinforce the same set of value propositions; circular reinforcement—a set of capabilities that reinforce each other; segregation—isolated portions of the overall capability network with little relationship to each other; and conflict—a set of capabilities that actually diminish the effect or the value derived from some other capabilities. Southwest Airlines is a good example of the alignment that occurs when a company focuses on a specific cost position and value proposition to a well defined market. The Amazon.com example cited earlier where the physical distribution of goods is accomplished by the mail rather than through some lower cost means appears as a conflict on a capability network. Constructing a Web based extension of a traditional retail business where the business model focuses on attracting customers to the store from the Web site and to the Web site from the store would be a circularly reinforcing business design. Segregation occurs where some or all of an underlying capability set such as research, development and manufacturing is used to support two distinct brands, such as Toyota and Lexus or the separation of Saturn's manufacturing, development and marketing from the other GM divisions.

The presence of undesirable patterns and the absence of desirable ones identifies opportunities for improvement. This isolates the capabilities that need to be strengthened and others that are under exploited. The addition of new alignments to important value propositions and the creation of new circular reinforcements among capabilities can be investigated by looking for partnerships or the purchase of tradable capabilities such as those enabled by technology resources. The presence of the causal relationships allow the identification of capabilities and resources that must be strengthened to improve the effectiveness of the enabled capability or value proposition.

The network also helps in predicting which competitive advantages are sustainable. Sustainable competitive advantage stems from the presence of unique resources and capabilities in the firm that are difficult to trade and hard to imitate. Often, sustainability arises not from a single capability, but from a bundle of capabilities that provides a unique form of synergy to the firm. The depiction of these sources of sustainability in the network helps identify opportunities to leverage them further. The capabilities and resources that support these unique capabilities can also be identified in order to appropriately value their contributions.

The framework of the invention may be used to develop schemes for valuation of the firm's capabilities and resources. The firm bears costs in the acquisition and maintenance of resources. Likewise, the firm derives value from the acceptance of the value propositions that it offers. The network of capabilities as described comprises the linkage between resources and value propositions internal to the firm. The relationships that comprise the network provide the basis for distributing costs from resources to value propositions and conversely for distributing value from value propositions to resources. As a result of the cost and value distribution, we compute both cost and value of the firm's capabilities for relative comparisons of their contributions within our framework. We suggest the use of this valuation process as helpful in clarifying the best set of investments in the continued development of the firm. Indeed, it may even be possible to develop an optimization model. When considering the firm's strategic investments in light of a set of alternative future scenarios, it is important to identify those capabilities and resources that will be expected to provide a business return across many scenarios. We call these capabilities robust and note that they are distinct from those more specialized capabilities and resources that provide a business return in only one future scenario or another. Our framework will help to quantify the business value of capabilities and resources considering that distinction. Moreover, the analytical schemes that we have developed allow for the attribution of costs of the various value propositions that the firm supports. As market segment sizes change, buyer preferences and needs vary, and competitors' offerings and pricing converges, the revenue that a firm can derive from a given offering to the market can change dramatically. In our work, we focus on the relative costs and expected revenues of value propositions to help distinguish the profitable, sustainable, and therefore, desirable strategic investments.

In summary, our invention focuses on a view of an individual firm that captures the essential strategic components and the interrelationships between them. In our approach to the problem, we note that a particular technology and the management of it represents a business capability. Amazon.com's scaleable servers supporting their Web-based catalog and representing their on-line virtual inventory is an example. IT capabilities are in many ways just like any other (non-IT) business capability: they comprise a set of skills, knowledge, and physical assets engaged in a set of activities that helps the client firm ultimately to serve a market need. To analyze IT capabilities, the real unit of analysis that is of interest to the client, we need a robust and complete description of what IT capabilities are and we need to be able to place IT capabilities in the context of all else that businesses do.

From the broader perspective of general business capabilities, we can reformulate IT valuation questions in terms of the larger business problem of studying business capabilities in general:

What capabilities are needed to support my current/ desired strategic position?

What resources support/enable these capabilities?

What are the business returns from investments in these resources?

What can be done to increase the returns from investments in these resources?

In these questions, we are focusing on analyzing the firm as a collection of capabilities and resources deployed to support the strategy of the firm for serving a market.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

FIG. 1 is a schematic showing decomposition of value propositions in a particular business context.

FIG. 2 is a chart depicting the graphical representation of correlation between two attributes, comparing deduced and induced correlations for buyer and attribute models.

FIG. 3 is a chart depicting a supporting relationship between positively and negatively valued attributes, for buyer and attribute models.

FIG. 4 is a chart depicting supporting and correlation relationships based on modeling the internal capabilities of a supplier.

FIG. 5 is a diagram showing the relationship between value propositions, value attributes and customer decision processes.

FIG. 6 is a schematic showing a capability network with a metric for the degree of support from one capability to another.

FIGS. 7a–c is a series of capability networks showing the benefit of a detailed representation of capabilities in determining means for improvement.

FIGS. 8a is a capability network showing a coordinating capability.

FIG. 8b is a capability network showing a coordinating capability which functions as an integrator.

FIG. 9a is a capability network showing synergy which requires the presence of each of several supporting capabilities.

FIG. 9b is a capability network showing supporting capabilities which in addition, if all are present together, provide synergetic support.

FIG. 10 is a graphical depiction of relationships between capabilities, resources and value attributes in a strategic capability network.

FIG. 11 is a chart showing a resource cost function.

FIG. 12 is capability network showing supporting contribution weights for supporting capabilities, supporting resources, synergy nodes, and capabilities which provide support directly as well as through synergy nodes.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Strategy formulation for the producers of goods and services should begin by considering the value delivered to the buyer and recognize the decision process and evaluation of that value from the buyer's point of view. In some cases strategy formulation might be influenced by the internal resources and capabilities of the firm, but even in these cases, the nature of the influence only becomes clear in the context of the value being delivered externally.

When buyers (end consumers, retail, corporate purchasing, etc.) consider a purchase of goods, services, or bundles of both, they ultimately evaluate a set of attributes including price and other features to make the binary decision: to buy or not. A model of the buyer's view of the

offerings of a firm is a useful starting point to focus the discussion of strategy. Such a model should help in the understanding of the buyer's decision process by identifying the relevant attributes of the product and the value placed on these attributes by the buyer. This model should aid in the identification of class of buyer that the firm is targeting and reflect the specific tradeoffs and choices that the firm has made in making an offering to a target class of buyers.

Turning now to FIG. 1, we will describe our model of the offerings of a firm. It incorporates a two-level decomposition of the value that a firm offers to the market. Value propositions 101 appear at the top level. These are the major groupings of value that the firm offers. As a group, they may represent a unique offering to the market. General examples are: low cost, high quality, and customer convenience. The specific value propositions shown are low price 102 and convenience 103. The second level of the hierarchy describes how each value proposition is delivered in terms of the value attributes of the offering. These are the specific characteristics of the value propositions that the firm has chosen to provide.

A firm's ability to deliver a value attribute relies on a set of activities it performs. This set may be collectively thought of as a capability. The quality of the value attribute delivered is directly related to the effectiveness of the supporting capabilities. Examples of capabilities include: innovative design of products or in-store merchandising. Capabilities themselves may be supported by other capabilities. The resulting network of interrelated capabilities forms the second layer of our framework.

The bottom layer of our framework is composed of resources, These are the physical assets that a company deploys to perform the activities represented by its capabilities. Examples may include: in-house engineers and designers, store locations, store layout design staff. Our definition of resources is distinct from that given in the Resource Based View of the firm. Resources represent the tangible (people, policies, capital, technology, etc.) and intangible (brands, etc.) assets of the firm. Usually, resources have a finite capacity to support a firm's activities. They are the points at which a firm directs its investments. Acquiring more capacity usually involves additional costs to the firm.

These concepts and the linkages between them form the strategic capability network. This framework focuses on the capabilities of the firm and places strategic value on them based on the degree of their support to the external value propositions made by the firm. By linking capabilities to the enabling resources of the firm, the framework assists in guiding strategy formulation to the investment or disinvestment decisions that must ultimately be made by the strategists. We now describe these concepts in depth and fit them into the SCN framework.

Value Propositions

At the top of our framework appear value propositions. These form some general statement of the customer benefits that the business delivers. In general, marketing or advertising oriented messages such as "every day low price" or "large selection" are good starting points for defining value propositions. For the buyer, these will help form the general categorization of the supplier's offerings. Southwest Airlines' 1985 ad entitled "The Company Plane" helps make the point. It reads as follows:

" . . . With a schedule that dovetails beautifully with your own. With first rate service that includes complimentary beverages. And everyday fares that are so low it's almost like flying for free. Because our flights are so

ation **722** so as to enable long term contracts with suppliers **723** which would positively support close supplier relations **702**, in contrast to the negative support **700** shown in FIG. 7*a*. Long term contracts **723** coupled with high volume purchasing **724** enable reduced raw material price **725**, which in turn leads to low operating costs **705** as in FIG. 7*a*.

Types of Capabilities

Capabilities may be categorized based on the nature of their relationships with other capabilities. Such a classification helps in identifying the strategically relevant capabilities of a firm as well as in the subsequent analyses, which are often dependent on the nature of these relationships. There are three general categories of capabilities that could exist in a firm. The first category consists of functional capabilities that perform the primary business functions of the firm. Examples of capabilities described above, such as market analysis, purchasing, and new product development fall into this category.

The second category of capabilities that firms should also possess are coordinating capabilities. This category includes capabilities that represent organizational and managerial routines that are designed to coordinate the outcomes of multiple capabilities, so that another capability can make better use of these outcomes. The modeler of a capability network should look for the existence of these capabilities whenever a capability requires support from others. The network representation of a coordinating capability will depend on the nature of its relationship with the other capabilities. We identify three variations here. When the effectiveness of a capability supported by other capabilities increases due to the presence of a coordinating capability, it can be represented as yet another supporting capability. Just as the other supporting capabilities work to increase the effectiveness of the supported capability, so does the coordinating capability. This situation is represented by the capability network shown in FIG. 8*a*. The enabling effect on supported capability **805** of supporting capabilities **801**, **802** and **803** is enhanced by coordinating capability **804**.

In other cases, the effectiveness of the supported capability is gated by the coordinating capability. That is, the outcomes of the supporting capabilities are channeled through the coordinating capability, which has the role of an integrator. Without its presence, the supporting capabilities, however effective individually, cannot combine to provide support to a capability. In this case, the coordinating capability occupies a different position in the capability network, as shown in FIG. 8*b*. Supporting capabilities **811**, **812** and **813** enable integrating capability **814** to in turn support capability **815**. While not shown in FIGS. 8*a* and 8*b* for simplicity, it should be noted that coordinating capability **804** and integrating capability **814**, as well as the supporting capabilities which are being coordinated and integrated, respectively, may in turn be supported by some combination of firm assets and resources and other capabilities.

Another variation in the nature of the relationship between the supporting capabilities and their coordinating capability is the presence of synergy between the supporting capabilities. With reference to FIG. 8*b*, suppose that the effectiveness of the integrating capability **814** is zero if any one of the supporting capabilities **811**, **812** or **813** is absent. In other words, the presence of all three capabilities results in a synergism that is exploited by the integrator. For example, the capability to sell online depends on an online database of products, a secure financial transactions handling capability, and a distribution capability. In the absence of any of the enabling capabilities, the capability to sell online disappears. This type of relationship is represented as

shown in FIG. 9*a*. Supporting capabilities **911**, **912** and **913** enable supported capability **915** through a relationship represented by synergetic capability **914** and a line **916** tying together the respective supporting vectors from capabilities **911**, **912** and **913**.

FIG. 9*b* shows the network when the relationship is not of a strict all-or-nothing nature. Here, the individual supporting capabilities do individually influence the effectiveness of the supported capability, but the simultaneous presence of all three causes an extra boost in the effectiveness. The synergetic capability reflecting this extra boost is represented in the same way as shown in FIG. 9*a*. But there has been added lines **917**, **918** and **919** showing that capabilities **911**, **912** and **913**, respectively, individually support capability **915**.

The strategic significance of representing coordinating capabilities as shown in the above described figures is in determining their value in relation to the value of the supported capability. Without explicitly representing their gating effect between the supported and supporting capabilities, it may be hard to realize their strategic importance and value. When attempting to reduce costs, these capabilities may be the first to go. When designing a new network, these capabilities may be ignored. Often, these are the capabilities that are rare and hard to imitate and, therefore, are the source of sustained competitive advantage in the network. It may also be possible that these "coordinating" capabilities are actually the cause of reduced effectiveness, perhaps when supporting capabilities have been altered to enter the information age. This phenomenon also needs to be represented and strategically understood before changing the implementation of capabilities.

The final category of capabilities are those that improve the effectiveness of other capabilities through learning. Unlike the capabilities in the previous categories, a learning capability does not support the current effectiveness of another capability in a time-independent manner. Instead, the nature of support is to increase the rate at which the capability improves over time, influencing its future effectiveness. This distinction is important for the analyses that can be performed with a capability network. For example, the value of a learning capability is less if it supports a capability whose value is expected to decrease over time. Conversely, a learning capability is valuable even if it supports a capability that provides little value at present, but is expected to be more valuable in a future scenario. Learning capabilities are not distinguished graphically from others in the network. They accumulate learning from the inputs of other capabilities and provide a more valuable input to other capabilities over time.

Capability Network Construction

When constructing a capability network, the modeler has two starting points. The inside-out approach starts from the core capabilities, assuming that these are known. From a given core capability, the modeler needs to identify the capabilities directly supported by it. Support may be either positive (enhancing) or negative (conflicting). Then for each of these capabilities, the same process has to be repeated. As discussed above, a capability identified in a previous step may need to be split into multiple capabilities when it turns out that there are multiple types of outcomes from that capability. This process continues until the capabilities that directly support the firm's value propositions are identified. Next, for each of the capabilities represented so far, their supporting capabilities need to be identified. For any new capability, this process of finding its supporters has to be repeated. This process continues until the tangible firm assets and resources are identified and linked to the capa-

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bilities they support. This approach may be suitable for an existing business with known core capabilities, when the objective is to discover new opportunities where they may be utilized to realize value.

The reverse approach starts from the external value propositions that a firm makes or wishes to make. For each of these value propositions, the capabilities needed to support it have to be identified. This process is then repeated for the identified capabilities until the firm assets and resources are identified and linked. During this process too, capabilities need to be split up into the appropriate level of detail when it appears that a capability is supporting multiple types of outcomes. This outside-in approach may be suitable for a new business or when an existing firm has a clear idea of the market it wishes to participate in and wishes to discover the combination of new and existing capabilities it needs in order to enable it to do so.

Resources

Resources, in our framework, ground the cost structure of the entire Strategic Capability Network (SCN). Because they are used with the activities of the firm, we have devised a set of usage based cost drivers that link resources to capability and therefore allow for computation of the relative costs of capabilities.

Relationships: Strategic positions are supported by interrelated networks of capabilities which are in turn supported by resources. The connections in the SCN between resources, capabilities and strategic positions are relationships (links) having the following properties:

They are causal (i.e., directional). This means that a relationship explicitly depicts a source capability or resource causing a change in state, strength, or effectiveness of a target capability or strategic position.

They describe the degree to which one capability influences another, characterized by multiple attributes in qualitative and quantitative form. Some of the qualitative attributes cause a measurable change in the influence that one capability exerts on another. These are mapped to quantities for inclusion into a mathematical function that combines the attributes into a single quantitative measure. The influence might be that the target is made stronger or could not exist at all without the source.

They also describe the degree to which one capability or position utilizes the enabling resource or capability.

They may be uncertain (represented by a probabilistic link strength). Relationships as depicted within this framework are not necessarily completely deterministic or even necessarily observable. They encompass all cause and effect linkages that are observable and all cause and effect linkages that a management team believes to exist.

Relationships can be combined in at least one of the following ways:

Logical and: All of the sources must exist for the target to exist.

Logical or: With any of the sources, the target will exist.

Additive, subtractive, or other functions: A target's state is the combined effect of the supporting sources. These can be accumulated by a variety of functional forms (+, −, min, max., etc.).

Through the process of developing such a network, we are making explicit the tacit understanding of the firm as held by the management team. In general practice, a variety of schemes are used to develop consensus and to align the activities of a firm. Within the SCN framework we expect to integrate the beliefs, expert opinions, and measurable data in a way that aids the formulation and analysis of a firm's strategy.

At this point it is important to note several kinds of insight that we expect these analyses to provide. First, the process of constructing a single network representing the collective understanding of the participating team will identify, and articulate in a common form of expression in accordance with the invention, the areas where individuals hold contradictory or conflicting understanding of their firm's strategy and the ways the strategy is or should be pursued. Second, the results will identify those areas where the current construction of the business is flawed, has deviated from the original intent, or can be improved. Third, the results will identify those areas where the current beliefs of the management team should be tested.

Commentary on the Proposed Framework

We expect that firms will always rely predominantly on the experience and judgment of its people in the development of strategy. Our invention is directed at aiding and enhancing what managers do rather than attempting to replace the people and the human reasoning in the strategic process. Our invention recognizes the difficulties of using past experience in the formulation of future plans. Since the environment continually changes, some past experience can be irrelevant or misleading. Not all members of the management team have the same experiences or the same view of their company and we believe that is desirable. However, we feel that a management team can derive advantage from developing a well understood consensus on what to do while preserving the diversity in experience and viewpoints that comprises its collective understanding of the firm. We refer to the general business literature on various aspects of strategic alignment as proof of that advantage. Our invention provides a framework, notation and procedure for doing this.

In the previous section we highlighted the development of consensus, the identification of design flaws and the isolation of assumptions that should be tested as some of the expected benefits of our framework when put into practice. We believe these benefits are reasonable to expect, because they are noted in the general literature on cognitive mapping in application to other domains. From discussions with practicing consultants during the project to date, we note that these are extremely desirable insights to gain in the view of our clients. Citing again the general business literature on strategic alignment of major business functions, we believe that these insights when communicated across a business team can effect changes within the firm that will result in provable and measurable improvements in business performance.

Analysis Enabled by the SCN Framework

The Strategic Capabilities Network is formulated as a framework for supporting various kinds of strategic analyses. This section describes some of these analyses and their potential value. These descriptions are ordered according to increasing input data requirement and perhaps represent the sequence in which the analyses may be done in a consulting engagement.

Qualitative Network Design Analysis

Once the network of strategic positions, capabilities, and resources have been identified and agreed upon, and formulated in accordance with the invention, certain types of analyses may be done even before gathering the data needed to do the quantitative analyses described later. The degree of

lection and gathering devices and related peripherals. The system includes an at least partially wearable data collection terminal, associated peripherals, and a communication system.

The data collection system of the present system may utilizes, for example, a wearable data collection terminal having a computer processor, associated memory, inputs, and outputs. Associated peripheral devices may include voice inputs and outputs, an optically readable information set reader, a keyboard and/or touch-panel, intelligent-body-conforming battery packs, mass storage devices, a user position and next task location device, a display, a printer, and data communication system for both local area and wide area communication.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a local area network communication system of the present invention which includes a user worn data collection terminal of the type illustrated in FIG. 2 with a vehicle mounted host (user position and next task location device) operably connected through an RF link to a base station host computer for multiuser data collection and processing on a wide area network;

FIG. 2 is a perspective view illustrating a user worn wearable data collection terminal with associated headset and peripheral devices;

FIG. 3 is a perspective view of an exemplary wearable data collection terminal with associated headset and peripheral devices;

FIG. 4 is a partially exploded perspective view of an exemplary wearable data collection terminal with associated headset and peripheral devices;

FIG. 5 is a perspective view of an exemplary first embodiment of a headset for use with the present system;

FIG. 6 is a perspective view of an exemplary second embodiment of a headset for use with the present invention which illustrates in operation a wrist worn optically readable character set reader;

FIG. 7 is a perspective view of an exemplary third embodiment of a headset for use with a second exemplary embodiment of a wearable disintegrated data collection terminal having a wrist mounted optically readable character set reader with keypad and display and belt worn processor/ radio module with voice recognition;

FIG. 8 is a diagrammatic illustration of a power conserving local area network channel selection schema for use in the system of the present invention;

FIG. 9 is a diagrammatic illustration of a local area network schema of the present invention of the type partially illustrated, for example, in FIG. 1;

FIG. 10 is a diagrammatic illustration of an exemplary data collection and processing terminal with voice recognition and voice and data communication system;

FIG. 11 is a diagrammatic illustration of an exemplary network schema utilizing a cellular communication link;

FIG. 12 is a perspective diagrammatic view illustrating an exemplary application of the system of the present invention in an open air warehouse;

FIG. 13 is a perspective diagrammatic view illustrating an exemplary application of the system of the present invention in a warehouse;

FIG. 14 is a perspective view of an exemplary embodiment of the user position and next task location device of the system of the present invention;

FIG. 15 is a perspective view of an exemplary vehicle mounted terminal of the present invention for data collection (and user position and next task location) of the system of an exemplary embodiment of the present invention;

FIG. 16 is a perspective view of an exemplary vehicle mounted terminal of the present invention for data collection (and user position and next task location) of the system of an exemplary embodiment of the present invention;

FIG. 17A is a diagrammatic illustration of an exemplary embodiment of the vehicle mounted terminal of the present invention for data collection (and user position and next task location) of the system of an exemplary embodiment of the present invention;

FIG. 17B is a diagrammatic illustration of an exemplary embodiment of the vehicle mounted terminal of the present invention for data collection of the system of an exemplary embodiment of the present invention;

FIG. 18 is a perspective view of an exemplary embodiment of a laser scanner engine for use in an exemplary embodiment of the present invention;

FIG. 19 is a perspective view of an exemplary embodiment of a laser scanner engine for use in an exemplary embodiment of the present invention;

FIGS. 20 and 21 are perspective views of an exemplary color display module for use with the system of the present invention;

FIGS. 22 and 23 are perspective views depicting a preferred three-dimensional orthogonal scanner, or "profilometer" of the present invention;

FIGS. 24 through 26 are perspective views of a color data input stylus for use with a color display of the type illustrated, for example, in FIGS. 15 and 16;

FIGS. 27 and 28 are diagrammatic illustrations of a laser beam redirection mechanism for use with a laser display or scanner according to the system of the present invention;

FIGS. 29 and 30 are diagrammatic illustrations of a piezo electric film motor (two axis) for use with a laser display or scanner according to the system of the present invention; and

FIGS. 31 and 32 are side elevation views of a focusing system for a photosensitive array type optically readable information set reader according to the system of the present invention;

FIGS. 33, 34 and 35 are schematic illustrations of a preferred embodiment of a speech recognition system utilized in cooperation with the data collection and processing terminal of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention is described hereafter in terms of an exemplary embodiment for use in a warehouse or the like. It will be apparent to those skilled in the art that the invention may be practiced usefully in any industry to accomplish data collection, communication, and processing requirements. For example, as illustrated in FIGS. 1 and 2, a workperson 12 employed in a warehouse 14 may wear a wearable disintegrated computer 10 with a headset 16. The headset 16 preferably includes a personal display 18 and a microphone 20 for receiving voice recognition commands. FIG. 1 illustrates the workperson 12 reading an optically readable information set 22 on a box 24 within a warehouse 14 via a tethered optically readable information set reader 26. It will be appreciated that the reader 26 could be a laser scanner or an array based reader, likewise, the reader 26 may

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be wireless, working for example as is illustrated by FIGS. 8 and 9. It will also be appreciated that the workperson might be a nurse or other health care provider, for example, within a hospital reading an optically readable information set on a chart or medication or the like.

In operation the workperson 12 might be directed to the appropriate optically readable information set 22 via his display 18. The workperson 12 may then speak a command into the microphone 20 such as "READ" for example so as to cause the peripheral device to perform the commanded function. The workperson may be notified via his display that the information set 22 has been decoded. The information may be stored in flash memory on a flash memory feature card (feature card expansion slots 32 [for example, PCMCIA cards]) card or the like for processing later. However, the operator 12 might also issue a "SEND" command via the voice recognition microphone 20 so as to cause the, for example, multimode spread spectrum local area network (PCT Publication WO 96/38925) to communicate to a base station 36, which may for example be mounted on a forklift 34 (or other vehicle or at a fixed position within an area), or to a host computer 64 via a cellular link 38 or the like (FIGS. 10 & 11).

As best illustrated in FIGS. 3 and 4, the wearable data collection terminal 10 and headset 16 preferably include a flex circuit 60 having a plurality of electrical connectors connected thereto for connecting PCMCIA cards having different features, for example a communication link (FIGS. 1, 9 through 11), a motherboard (such as an EPSON® CARDIO), a GPS 8-channel receiver (such as a MOTOROLA® ONCORE), a spread spectrum radio or wireless modem or the like (such as the NORAND® FALCON) [antenna 46], a removable mass storage device such as a disk drive or flash memory card [for batch downloading via a dock 58), a fax modem, or the like.

The flex circuit 60 is preferably attached to a non-stretching belt 40 and covered with a soft yet durable foam 42 (such as an antibacterial flame retardant laminate (urethane film+fabric) available from JPS Elastomerics). The terminal 10 may be held about a wearer's waist via a conventional hook and loop fastener 44. Additionally, the terminal 10 may be fabricated so as to provide support to the lumbar region of a user's back and to carry tools necessary to perform the workperson's tasks.

A variety of data collection peripherals may be tethered or wirelessly operatively connected to the terminal 10, for example a scanner 26, a keyboard 48, or a headset 16. Tethered peripherals may be connected to the terminal 10 via connectors such as 50, 52. Additionally, peripheral holders (54, 56) may be formed on the terminal 10 body for facilitating peripheral storage. Other various types of data collection peripherals may be contemplated such as a track-pad device or a touch-panel device, for example.

As illustrated in FIG. 4, intelligent battery packs 62 having a body conforming conformation (waist for example) may be pivotally (at least one axis) interconnected 64 such that the battery packs 62 may be utilized in series, parallel, in sequence, or to separately power peripherals, or the like. Each battery pack preferably includes a charge state indicator (not shown). The battery packs are preferably rechargeable while connected to the terminal 10 via a battery conditioner/charger (not shown), however, the packs 62 may also be removed for charging. Further, a back-up power supply (not shown) is preferably utilized in the event main battery pack 62 failure or the like occurs.

FIGS. 5 and 6 illustrate various headsets (16', 16") and an exemplary handset 66 which may be utilized with the wearable disintegrated terminal 10 or the belt mounted computer 10' (FIG. 7).

FIGS. 8 and 9 illustrate a schema for selecting a channel for sending or receiving communications between various layers of the system (i.e., peripheral-terminal, terminal-peripheral, terminal-base, base-terminal, peripheral-base, base-peripheral, host-terminal, host-base, host-peripheral, terminal-host, base-host, peripheral-host). FIGS. 10 and 11 illustrate various aspects of voice and data communication within the system as well as voice recognition features of an exemplary system.

Referring now to FIG. 8, a diagrammatic illustration of a power conserving local area network channel selection schema for use in the system of the present invention is shown. As shown in FIG. 8, the schema 100 comprises a multiple channel network wherein the desired channel is selected 102. A minimum operating power level is selected 104, and the reception of a signal is tested 106. If a signal is not received, then the power is increased 108, and the reception of a signal is again tested at the new power level 110. If a signal is not received, the power is increased and the reception of a signal is tested in an iterative manner until a signal is received. At that juncture, the optimum power setting has been determined 114, and frequency hopping 116 may then occur. If at the first signal reception test a signal is received, the power is decreased 112, and the reception of a signal is subsequently tested. This process repeats in the like manner as the power increasing iterations until the signal power level converges on the optimum power level 114.

Referring now to FIG. 9, a diagrammatic illustration of a local area network schema of the present invention of the type partially illustrated, for example, in FIG. 1 is shown. As can be seen in FIG. 9, the schema 118 comprises a host 120 connected to a base 122 being in communication with a plurality of terminals 124, 126, 128 and 130. Each of the terminals in turn utilizes a peripheral device 132, 134, 136 and 138, respectively.

Referring now to FIG. 10, a diagrammatic illustration of an exemplary data collection and processing terminal with voice recognition and data communication system is shown. As can be seen in FIG. 10, the terminal 140 includes a microphone that is mounted on the headset, controlled by the processor, and directly connects to a cellular phone chip set 142. The microphone in turn connects to a limited vocabulary speech recognition system and processor command interface 144. The interface connects to a terminal control processor having RAM, ROM, power control functions and communications protocol 152. The terminal control processor connects to an audio amplification and speech synthesis CVSD 146, which in turn connects to an earphone or speaker mounted in the headset and being processor controlled and directly connected to the cellular phone chip set 148. The terminal control processor connects to a communication controller unit 156 which in turn connects to the cellular chip set and support circuitry 158 which connects to a headset mounted antenna system 166. The terminal control processor also connects to a display driver and controller 150 which connects to a scanner and raster display device 160. The scanner and raster display device connects to a code scanner interface and controller 162 which in turn connects to a rechargeable power subsystem 164.

Referring now to FIG. 11, a diagrammatic illustration of an exemplary network schema utilizing a cellular communication link is shown. As can be seen from FIG. 11, the schema 168 comprises a terminal device 170 communicat-

United States Patent [19]

Harhen

[54] **MULTIPLE REASONING AND RESULT RECONCILIATION FOR ENTERPRISE ANALYSIS**

[75] Inventor: John Harhen, Galway, Ireland

[73] Assignee: Digital Equipment Corporation, Maynard, Mass.

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[58] Field of Search 364/512, 402, 419, 401; 395/51, 1.1, 600, 800, 11

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Primary Examiner—Thomas G. Black
Assistant Examiner—Paul R. Lintz
Attorney, Agent, or Firm—Kenyon & Kenyon

[57] **ABSTRACT**

A computer-based method and apparatus for enterprise analysis, with which a user can generate value projections by applying, in parallel, multiple reasoning methods. The invention presents a method and apparatus for creating a complex, networked model of an enterprise, or system and its environment, that is structured from categorized objects and relationships. Using the model, the present invention is self sufficient in determining which areas of the multiple reasoning methods to appy to the variable projection problem. Applying reasoning methods to a single projection problem generates a set of conflicting intermediate hypotheses that the present invention can resolve to form a single final hypothesis through a reconciliation process that evaluates quality factors associated with the intermediate hypotheses. A problem solution tree tracks the solution process to provide to the user a full explanation of the methods chosen or discarded and data relied upon or disregarded.

21 Claims, 21 Drawing Sheets
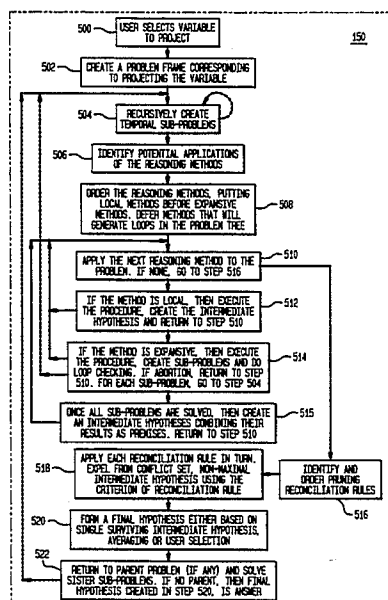
REMARKS

The Assignee would like to thank the Examiner for the courtesy extended to Jeff Oster during his recent visit to Washington D.C..

It is our understanding that concern was expressed about the use of the word "relationship" in claim 43 during the interview. The Assignee has provided an excerpt from a network definition that shows the use of the word relationship in claim 43 is consistent with a formal definition of a network.

> More formally, a network contains a set of objects (in mathematical terms, nodes) and a mapping or description of relations between the objects or nodes. The simplest network contains two objects, 1 and 2, and one relationship that links them. Nodes 1 and 2, for example, might be people, and the relationship that links them might be "are standing in the same room."

This definition of a network is well known to those of average skill in the arts of artificial intelligence (class 706), business methods (class 705) and data processing (class 707) that are contained in the above referenced application and other cross referenced applications.
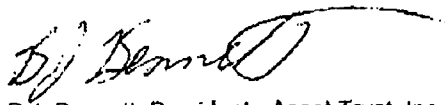
Reservation of rights

The Assignee hereby explicitly reserves the right to present the previously modified and/or canceled claims for re-examination in their original format. The cancellation or modification of pending claims to put the instant application in a final form for allowance and issue is not to be construed as a surrender of subject matters covered by the original claims before their cancellation or modification.

Conclusion

The pending claims are of a form and scope for allowance. Prompt notification thereof is respectfully requested.

Respectfully submitted,

[signature]

B.J. Bennett, President   Asset Trust, Inc.
Date: January 31, 2006

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Examiner: Siegfried Chencinski
Art Unit: 3628

Serial No. 09/761,670

PAGE 12/12 * RCVD AT 1/31/2006 7:45:51 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/25 * DNIS:2738300 * CSID:14254918311 * DURATION (mm-ss):04-22

Serial No.: 09/761,670   74

Related Proceedings Appendix

09/761,671 – opinion appears to be based largely on an assumption that VBM is different than SVA in a number of areas where they are in fact the same.

UNITED STATES PATENT AND TRADEMARK OFFICE

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4   BEFORE THE BOARD OF PATENT APPEALS
5   AND INTERFERENCES

6

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8   *Ex parte* JEFFREY SCOTT EDER

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11   Appeal 2007-2745
12   Application 09/761,671
13   Technology Center 3600

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16   Decided: August 29, 2007

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19   Before TERRY J. OWENS, HUBERT C. LORIN, and ANTON W. FETTING,
20   *Administrative Patent Judges.*

21   FETTING, *Administrative Patent Judge.*

22   DECISION ON APPEAL

23

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26   STATEMENT OF CASE

27   Jeffrey Scott Eder (Appellant) seeks review under 35 U.S.C. § 134 of a Final

28   rejection of claims 69-103, the only claims pending in the application on appeal.

29   We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6.

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31   We AFFIRM.

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